

Alberta

RESEARCH CAPACITY IMPACTS

2011 Report

Alberta Enterprise and Advanced Education

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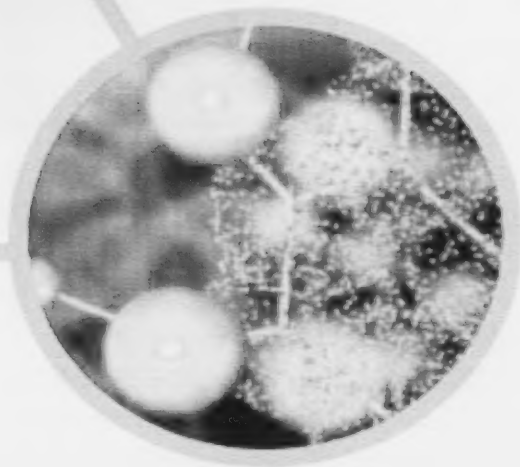
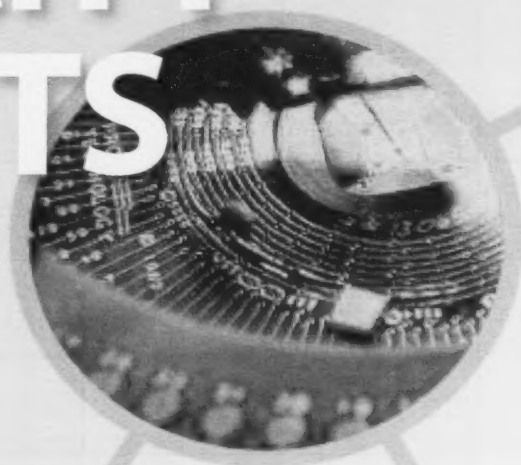
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RESEARCH CAPACITY IMPACTS





Research Capacity Program



For more information on the Research Capacity Program, please visit the EAE website at: <http://eae.alberta.ca/>

Managed by Alberta Enterprise and Advanced Education (EAE), the Research Capacity Program (RCP) has been an active participant in the funding of research infrastructure at Alberta universities since 2000. In that time, the program has significantly impacted the larger research community. By promoting research quality, fostering innovation, and supporting strategic initiatives, the RCP's activities are benefiting Alberta. Key research initiatives supported by the program have gained national and international recognition and contributed to Alberta through training a highly qualified workforce, providing new knowledge that leads to new company development and the development of treatments and diagnoses for improved health outcomes.

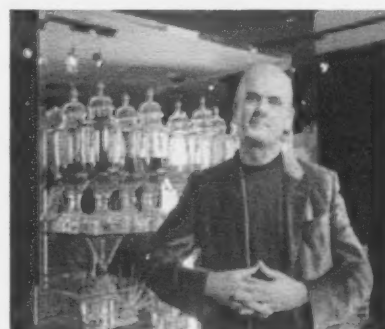
Since 2000, over 300 projects have been supported through the acquisition of research equipment needed in many different fields, such as health, energy, information and communications technology, nanotechnology and environmental stewardship. As this impacts report illustrates, these investments have supported research success by providing world-class research infrastructure to build capacity and to help Alberta's research intensive institutions recruit and retain top quality researchers.

The RCP also serves as an important mechanism for leveraging funds from the federal Canada Foundation for Innovation (CFI), the private sector and other sources in order to maximize the research dollars flowing into Alberta's

research priority areas.

Through the Alberta Research and Innovation Plan, the RCP aligns investments with the research priorities of the Government of Alberta (GoA), Alberta Innovates and Campus Alberta institutions. The alignment of research priorities in the province builds core capacity to enable Alberta's research and innovation system to support key outcomes for Albertans.

There are four RCP streams that parallel and leverage CFI funding streams. The College-Industry Innovation (CII) Stream has been recently initiated to build applied research capacity in the college and polytechnic sector. The new CII stream joins the RCP's existing Small Equipment Grants Stream (SEG) - enabling universities to acquire research equipment for individual researchers or small teams; and the Infrastructure Sustainability Stream / Research Infrastructure Stream (IS/RI) - supporting large multidisciplinary research infrastructure.



THE ALBERTA RESEARCH AND INNOVATION PLAN

Coordination and consultation between GoA ministries, Alberta Innovates, and Campus Alberta has enabled the annual development of the Alberta Research and Innovation Plan (ARIP).

The ARIP conveys the GoA's research directions and themes collaboratively developed by the ministries of Enterprise and Advanced Education, Treasury Board and Finance, Energy, Environment and Sustainable Resource Development, Health, and Agriculture and Rural Development. These ministries are involved in the major research and innovation activities of the GoA.

The ARIP provides the high-level summary of provincial research and innovation priorities to inform the Alberta Innovates corporations and Campus Alberta.

The ARIP's guidance is intended to spur stakeholder collaborations and enhance the province's research strengths in the strategic priority areas of energy, environment, agriculture, forestry, life sciences and health, as well as in the core areas of biotechnology, nanotechnology and information and communications technology.

To strengthen the research and innovation system and contribute to prosperity and quality of life, the ARIP has three core strategies, described in Table 1.

The Research Capacity Program supports the ARIP strategies with a focus on building a strong research and innovation base, which will contribute to social, environmental and economic benefits for all Albertans.

COORDINATING RESEARCH IN ALBERTA

In January, 2010, the Alberta Innovates corporations were established.

Alberta Innovates is an integral part of Alberta's research and innovation system, which is designed to strengthen the province's role as a world leader in using science to seek solutions.

EAE works with the corporations, the GoA and Campus Alberta Institutions to enhance innovation and to build research capacity in strategic priority areas.

The four corporations are:



Table 1

The Alberta Research and Innovation Plan	
Strategies	
Focusing on Targeted Areas: Strategically building on the strong base of research.	Identify and invest in strategic research initiatives that add value
	Pre-commercialization and knowledge translation capacity
Building Research Capacity: Maintaining a strong base of research strengths in Alberta.	People
	Research infrastructure
Developing a Dynamic and Aligned Learning and Research and Innovation System: GoA, Campus Alberta and Alberta Innovates as a system to advance research and innovation.	Enhance Pan-Alberta collaboration
	Optimize resources
	Create a culture of entrepreneurialism

Three core strategies are being pursued to strengthen the research and innovation system and to contribute to social, environmental and economic benefits for Albertans.

CUMULATIVE RESULTS

Since its inception in 2000, the Research Capacity Program (RCP) has invested more than \$213 million and has leveraged \$712 million more in other funding, bringing a total of \$925 million to support research and innovation activities in Alberta (Chart 1). As a catalyst for innovation, the RCP's leveraging ratio currently stands at 3:1.

The RCP uses a cost-shared funding approach to provide up to 40% of the total eligible project costs¹ for successful proposals, enabling projects to leverage support from the Canada Foundation for Innovation (CFI) and other sources.

Since its introduction, the RCP has invested in 328 research projects, which have enabled over 200 new and experienced professors to carry out their research activities in the province. By attracting and retaining highly qualified people with equipment and facilities, the RCP is creating a climate that builds synergy and collaborations among Alberta's leading researchers and providing state-of-the-art training opportunities for graduate students - the next generation of talented innovators.

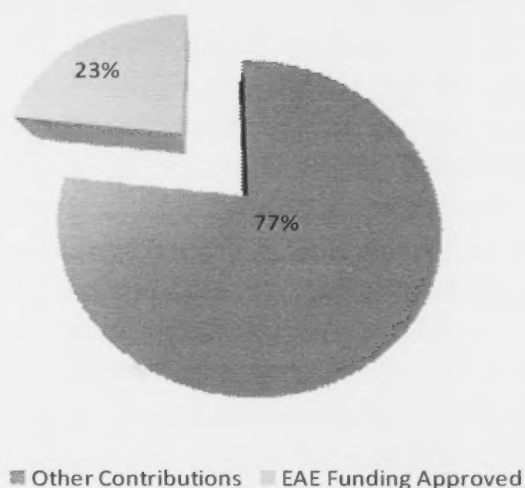
Key research activities enabled by RCP equipment support have gained national and international recognition and contributed to treatments and diagnoses for improved health outcomes, new environmentally sustainable practices, and increases in agricultural production to name a few.

This report focuses on selected research project highlights described on pages 12 to 24.

A listing of the RCP projects funded from 2006 to 2010 is detailed on pages 26 to 52.

Chart 1

EAE's Research Capacity Leverage from Total Project Funding of \$925.4 Million



¹Projects may include equipment, construction, renovations, specimens, and databases. Proposals must address strategic, fundamental infrastructure needs related to maintaining or enhancing the competitiveness of the Alberta university research system and contribute to Alberta's economic competitiveness and/or quality of life.



RCP FUNDING HIGHLIGHTS





Agricultural Genomics and Proteomics



TWO CENTRES FOR AGRICULTURAL GENOMICS AND PROTEOMICS RESEARCH

Two newly established agricultural research centres operating out of the University of Alberta's faculty of Agriculture, Life and Environmental Sciences are focused on creating new opportunities for Alberta's crop and livestock producers. Phytola and Livestock Gentec add to Alberta's international leadership in the bioindustrial sector with a focus on research, development and technology transfer.

Being located at the University of Alberta, Phytola and Livestock Gentec bring together some of the world's leading experts in agricultural biotechnology and provide connections to well-respected national and international networks. These networks, in conjunction with the support of the provincial government and industry partners, highlight the collaborative work taking place in Alberta to address areas of research priority.

PHYTOLA

Building on the success of the Bioactive Oils Program, and supported by a \$5.8 million major infrastructure investment from the Research Capacity Program (RCP) and the Canada Foundation for Innovation (CFI) in 2009/10, Phytola scientists



are exploring ways to improve the efficiency of oil production in plants, which could lead to improvements in both oil content and oil quality. Other recent infrastructure investments will ensure that Phytola researchers will benefit from equipment supporting the development of specialty oils for nutraceutical and industrial applications. Applications for the oils include products such as health supplements, livestock feed and aquafeed. In addition, industrial applications for these oils are being seen in the area of petrochemical alternatives for the creation of lubricants and plastics.

Currently research at Phytola is being supported by an Alberta Innovates - Bio Solutions' investment of \$2.25 million over two years. The centre is led by Dr. Randall Weselake,

a professor in the University of Alberta's department of Agricultural Food and Nutritional Science and a Tier I Canada Research Chair. Dr. Weselake is known internationally for his research in the molecular biology of storage lipid biosynthesis in oilseeds. His team members are expert scientists in molecular biology, genetics, biochemistry, plant breeding, lipid analysis, bioinformatics and oil processing and functionality testing.

LIVESTOCK GENTEC

Building on the success of the Agriculture Genomics and Proteomics Centre, and supported by a \$3.4 million major infrastructure investment from the RCP and the CFI in 2004/05, Livestock Gentec researchers are building a greater understanding of animal genomes and exploring ways to produce healthier, more efficient cattle for improved beef and milk products. Infrastructure investments have enabled Livestock Gentec to acquire advanced imaging and analysis equipment that have been used to perform gene expression studies, sequencing and genotyping. This equipment has attracted external research funding from industry and has supported the development of strong industry partnerships, highly trained personnel, and valuable intellectual property at the centre.

Livestock Gentec scientists were major participants in the first-ever sequencing of the bovine genome and have already identified more than 125 genetic markers to improve cattle through selective breeding. More than a dozen have been commercialized and many are in the technology transfer pipeline.

Currently research at Livestock Gentec is supported by an Alberta Innovates - Bio Solutions investment of \$2.25 million over two years and an Alberta Livestock and Meat Agency investment of \$1.5 million over three years. The Centre, led by Dr. Graham Plastow, is known as a world leader in livestock genomics research, development and technology transfer.

RELATED INVESTMENTS

In addition to funds received by Phytola and Livestock Gentec, the RCP has also provided agricultural genomic and proteomic infrastructure funding to:

- Dr. Michael Dyck, who investigates reproductive physiology in swine;
- Dr. Stephen Strelkov, who studies plant pathogen virulence and host resistance;
- Dr. Linda Hall, who assesses environmental biosafety & integrated weed management;
- Dr. Jianping Wu, who studies egg protein chemistry;
- Dr. David Bressler, who researches the conversion of conventional agricultural products to value-added commodities; and
- Dr. Daniel Barreda, who studies how inflammatory mechanisms of immunity contribute to health and the prevention of disease.

Hotchkiss Brain Institute



The Hotchkiss Brain Institute (HBI) was launched in October 2004 following a foundational gift from the Hotchkiss Family and with the University of Calgary and the former Calgary Health Region, as key partners.

The HBI operates as a unit within the University of Calgary's Faculty of Medicine, and is led by Dr. Samuel Weiss. The mission of the HBI is to be a centre of excellence in neuroscience and mental health research, translating discoveries into innovative health care solutions. HBI researchers study healthy and diseased brains, spinal cords and peripheral nerves to assess, understand and disseminate knowledge about the diseases affecting the nervous system. The HBI brings together more than 120 scientists as members of the Institute, who investigate basic, population health and clinical sciences. By bringing together these scientists, HBI aims to have a collective expertise in the field of neurosciences.

The HBI's Director, Dr. Weiss, ensures that the HBI's research and education programs maintain a level of internationally recognized excellence. Dr. Weiss is a renowned researcher, having made the breakthrough discovery that adult neural stem cells are capable of repairing the brain damage after a stroke. This was an unexpected discovery of the basic research Dr. Weiss was conducting. Now, researchers are also testing neural stem cells for their capacity to repair and treat multiple sclerosis, spinal cord injury and perhaps even mental health



HBI, located in The Health Research Innovation Centre, University of Calgary.

disorders, such as depression and anxiety. In 2008, Dr. Weiss earned one of the world's most prestigious medical science awards, a Gairdner International Award. Historically, one in four Gairdner awardees has gone on to win a Nobel Prize. Currently Dr. Weiss holds many patents in the neural stem cell field and has founded three biotechnology companies.

Ten years ago, Dr. Weiss received \$1.1 million from the Research Capacity Program (RCP) and the Canada Foundation for Innovation to set up his genetics and developmental biology laboratories at the University of Calgary and to acquire advanced imaging and analysis equipment. The equipment, paired with federal and industry funding, has supported the development of strong industry partnerships,



Dr. Samuel Weiss - Hotchkiss Brain Institute Director,
Department of Cell Biology & Anatomy/Pharmacology &
Therapeutics; Member, Genes and Development Research
Group, Faculty of Medicine, University of Calgary.

highly trained personnel and valuable intellectual property at the HBI, all of which have contributed to diversifying the Alberta economy and enhancing Alberta's reputation for innovation in the rapidly expanding biomedical field.

HBI members work collaboratively within three foundational research areas: Axon Biology and Regeneration; Cerebral Circulation; and Neural Systems and Behaviour. HBI members come from many divergent departments at the University of Calgary, including Clinical Neurosciences, Physiology and Pharmacology, Psychiatry, Cell Biology and Anatomy, Psychology and Diagnostic Imaging.

The Axon Biology and Nerve Regeneration research theme at the HBI is focused on reconnecting and regenerating broken spinal cord and nerve axon wires to allow recovery from paralysis or loss of sensation. Foundational research in this area also offers promise to those suffering from diabetic neuropathy and multiple sclerosis.

The Cerebral Blood Flow and Metabolism theme at HBI is an integrated initiative where foundational science is used as the platform to advance the treatment of stroke and dementia. Researchers in this theme study refined blood flow measurements at the cellular level, as well as blood vessel imaging in the living brain. This group approach of active collaborations among basic science researchers, engineers and physicians ensures rapid translation into clinical practice and is making the HBI a world leader in brain imaging and the

treatment of stroke.

The Synaptic Transmission and Neural Networks theme at the HBI is focused on making advances in determining the mechanisms that regulate the dialogue between clusters of cells in the nervous system. These synaptic communications control thought, feeling, and movement critical for survival, learning and interacting with the world. Research in this foundational theme underpins the premise that synaptic dysfunction is at the heart of numerous neurological and mental health disorders.

RELATED INVESTMENTS

HBI members who have received approximately \$3.7 million in infrastructure related funding from RCP include:

- Dr. Richard Frayne, who uses magnetic resonance imaging (MRI) technology to track blood flows in the brain at the tissue level;
- Dr. Marc Poulin, who studies blood flow to the brain;
- Dr. Bradley Goodyear, who focuses on functional imaging of stroke, epilepsy, multiple sclerosis, and parkinson's disease;
- Dr. Michael Antle, who investigates the brain's mammalian circadian system;
- Dr. Douglas Zochodne, who researches regeneration of peripheral nerves, which are the connection between the brain, spinal cord, muscles and skin;
- Dr. Roger J. Thompson, who studies stroke and other neurodegenerative disorders; and
- Dr. Shalina Ousman, who does research in multiple sclerosis, a devastating neurological disease of young adults.

Selected Project Highlights

BROADBAND NETWORK REWIRING IN SUPPORT OF BIOINFORMATICS AND IMAGING



Professor, Department of Biochemistry and Molecular Biology, Adjunct Professor, Department of Computer Science, Director, Visual Genomics Centre

Dr. Christoph Sensen

UNIVERSITY OF CALGARY

The RCP grant provided Dr. Sensen with the infrastructure essential for broadband network connectivity for innovative research activities taking place in the Faculty of Medicine and heavily influenced the ability of the Faculty to facilitate the cross-disciplinary research work.

Research Capacity Program (RCP) infrastructure funding was acquired by Dr. Sensen in 2002 for core equipment and cabling to support broadband network connectivity for researchers in the University of Calgary's Faculty of Medicine.

This equipment has enabled greater access to rapid, reliable, and high-capacity computing power upon which research is increasingly reliant. This infrastructure has provided essential broadband network connectivity in the Faculty of Medicine, facilitating cross-disciplinary research and close working relationships between the Faculty's seven transdisciplinary research institutes and three centres.

The RCP supported infrastructure has been tremendously successful in facilitating well over 300 academic articles by the principal users in information and communications technology intensive research, such as bioinformatics and imaging. However, the impact of this infrastructure has been broader, becoming central to nearly all research functions in the Faculty of Medicine.

An average of 441 graduate students per year

received training using the bioinformatics and imaging infrastructure. Through the Faculty of Medicine's interdisciplinary graduate training environment, students are registered in one of the following graduate programs, which cut-across academic departments and institutes:

- Biochemistry & Molecular Biology
- Biomedical Technology (MBT)
- Cardiovascular & Respiratory Sciences
- Community Health Sciences
- Gastrointestinal Sciences
- Immunology
- Microbiology & Infectious Diseases
- Medical Science
- Neuroscience

The original vision of this infrastructure, to facilitate user collaborations across the Faculty of Medicine at the University of Calgary, has certainly been realized, and has led to an increased profile for both bioinformatics and imaging as core research capabilities of the University of Calgary.

ALBERTA CARDIOVASCULAR AND STROKE RESEARCH CENTRE



Scientific Director,
Mazankowski Alberta
Heart Institute
Professor, Department
of Pediatrics
Adjunct Professor,
Department of
Pharmacology

Dr. Gary Lopaschuk

UNIVERSITY OF ALBERTA

Dr. Lopaschuk's grant provided research equipment for the Alberta Cardiovascular and Stroke Research Centre at the Mazankowski Alberta Heart Institute. The Centre studies the effects of heart attacks and strokes, and houses state-of-the-art cardiovascular imaging tools, basic science core labs, a gene therapy facility and an outcomes research centre.

The Alberta Cardiovascular and Stroke Centre (ABACUS) is a multidisciplinary faculty supported with infrastructure funding from the Research Capacity Program (RCP) with a mission to perform outstanding research aimed at the prevention and cure of cardiovascular disease, the leading cause of death in Alberta and Canada. The translational focus of this Centre reflects the commitment to approach cardiovascular disease at levels ranging from molecules to populations. ABACUS is a dedicated research facility that combines clinical and basic research equipment to facilitate state-of-the-art translational studies in cardiovascular research.

The Centre is located in the Mazankowski Alberta Heart Institute and is strategically aligned with the University of Alberta's Faculty of Medicine and Dentistry and Alberta Health Services. ABACUS consists of a Sterotaxis Catheterization Laboratory, a 64 slice computer tomography imaging facility, a computer tomography-SPECT imaging facility, an echocardiography laboratory, an exercise stress testing laboratory, a vascular biology core laboratory, an outcomes/population health core facility, a clinical trials coordinating centre, and a data analysis/digital classroom.

ABACUS enables researchers to quickly apply breakthrough therapies and revolutionary biomedical devices to patients participating in studies or clinical trials. This innovative centre

not only helps patients, but also helps Canadian scientists to perform ground breaking research and compete on the international stage. Presently, ABACUS has over 30 clinical trials ongoing in its facilities. New research advances discovered in the clinical research facility will be rapidly translated into clinical care for patients. In fact, ABACUS is the point of first clinical care for a number of cardiovascular patients in the Edmonton area.

ABACUS serves as a training environment for numerous University of Alberta students (graduate students, health sciences faculty trainees, and post-graduate residents and fellows). This training is both translational and trans-disciplinary. The Shaw 3i Digital Classroom is an excellent training facility to promote this research training.

The presence of ABACUS has also been instrumental in the recruitment of five new clinician scientists to Edmonton. The sophisticated and unique clinical research facilities were a key reason for these individuals relocating to Edmonton. This includes the recruitment of world recognized clinician scientists from Oxford, Liester, Harvard, Stanford, and Philadelphia.

MOLECULAR MECHANISMS OF SMALL RIBONUCLEOPROTEINS



*Assistant Professor,
Department of
Chemistry and
Biochemistry*

Dr. Ute Kothe

UNIVERSITY OF LETHBRIDGE

New research infrastructure addresses the function and structure of small ribonucleoproteins, essential cellular complexes consisting of RNAs and proteins. Kothe's multi-disciplinary investigations will provide crucial information on the building principles of cellular machines and the molecular causes of diseases.

Research Capacity Program (RCP) funds were used to equip a new physical biochemistry laboratory for the principal investigator, Dr. Ute Kothe. Her research team investigates the structure and function of protein-RNA complexes, in particular during early stages of ribosome biogenesis. Ribosomes are large cellular machines consisting of RNA and proteins which are responsible for protein synthesis in all living cells.

Worldwide, RNA research is rapidly increasing because of the importance of these molecules in regulating many cell functions. Dr. Kothe's lab provides insight into the molecular causes of diseases such as cancer and inherited disease syndromes which could lead to new drug designs in pharmaceutical research.

Dr. Kothe's research has also had significant relevance to the design of nanobiomachines for biotechnology purposes, supporting Alberta's efforts to become a national leader in the field of nanobiotechnology. Her multi-disciplinary investigations are poised to increase our understanding of RNA and proteins as the building blocks of future nanomachines, supporting the development of the biotechnology sector in Alberta.

The RCP infrastructure funding acquired by Dr. Kothe in 2008 has contributed to the creation of a truly interdisciplinary training facility for

researchers focused on classical biochemistry, state-of-the-art biophysics, molecular biology and yeast genetics, providing a breadth of training invaluable for recruitment to academia and industry.

The state-of-the-art equipment in the Kothe lab was a key attraction for all four graduate students who have joined the group in the past years and it has contributed to the retention of undergraduate students at the University of Lethbridge who have continued graduate studies with Dr. Kothe or with collaborating research groups.

The research facilitated by this RCP funded equipment has made the Kothe lab one of the strongest biophysical RNA research groups in Canada. This has resulted in an important collaboration with three RNA groups at the Université de Sherbrooke, aimed at understanding the function and regulation of different enzymes for RNA modification. It is anticipated that more collaborations, in particular with RNA researchers in Alberta, will develop in the near future as the Kothe group has now reached its full capacity and productivity.

ACCESSIBILITY TO EDUCATION USING LEARNING OBJECTS: IMPLEMENTING THE SEMANTIC WEB WITH ADVANCED DEVELOPMENT & TESTING OF APPLICATIONS



*Associate Vice
President, Research*

Dr. Rory McGreal

ATHABASCA UNIVERSITY

Dr. McGreal's infrastructure grant was used to advance the development of innovative e-learning technologies, specifically to create a testbed of linked repositories of digital content.

Mobile learning research is being conducted through Athabasca University using this state-of-the-art equipment provided by the Research Capacity Program (RCP). In 2005, Dr. Rory McGreal acquired funding support from the RCP to test standards for downloading learning content onto mobile devices using proxy servers and effectively formatting instructional materials for smaller screens on mobile devices. Based on the awarded infrastructure, several iPhone applications have been developed for profiling the university as well as for interactive drawing and designing.

This mobile learning research is intended to further enable students to study from their homes and workplaces by increasing their access to learning and improve their quality of life by reducing travel needs. Opportunities supported by Athabasca University's mobile learning research equipment are also expected to aid in the development of commercializable products and services, and establish more effective training services for new immigrants using mobile devices.

Athabasca University researchers in the fields of education and information and communications technology have been collaborating with each other as part of interdisciplinary teams—making this program a success. It has also been noted that access to the advanced technology provided by this research initiative has also

been a strong influence on faculty retention at the University.

The infrastructure established by Dr. McGreal and his team has been central to the ongoing partnerships that Athabasca University currently has with Xerox, Cisco and Lyryx in Calgary. Partnerships are also being developed with Suncor, Smart Tech, MuchLearning, the Mennonite Centre, and Alberta North. Moreover, this infrastructure has enabled Athabasca University researchers to develop working relationships with smaller Alberta-based companies in mobile learning technologies. For example, researchers are presently negotiating with a small company in Edmonton to enable their learning applications on mobile devices.

Innovative e-learning technologies have helped researchers keep up-to-date with software applications developed on the latest equipment available. The Mobile learning research group at Athabasca University is also responsible for stimulating the University's full participation in federal consultations on the issue of copyright and the digital economy based on how they relate to the future of learning using the latest mobile devices.

PROTOTYPE IMPLEMENTATION FOR THE ALBERTA BIODIVERSITY MONITORING PROGRAM



Professor and
NSERC Industrial
Research Chair in
Integrated Landscape
Management

Dr. Stanley Boutin

UNIVERSITY OF ALBERTA

Dr. Boutin's grant established the Alberta Biodiversity Monitoring Institute (ABMI) which measures and reports on the health of Alberta's biodiversity. The ABMI is being applied to management systems to establish baseline data and regional goals for biodiversity and then track performance against those outcomes. Notable applications of the ABMI include forest stewardship, oil sands stewardship, and land-use planning.

With infrastructure funding support from the Research Capacity Program (RCP), the Alberta Biodiversity Monitoring Institute (ABMI) has become one of the most rigorous and broadly supported biodiversity monitoring programs in the world. The program was conceptualized in 1997 by scientists and managers at the University of Alberta, Alberta Research Council, Foothills Research Institute, and the Ministry of Sustainable Resource Development. During the next six years, Dr. Boutin's team coordinated the involvement of over 40 scientists to develop program objectives, sampling design and monitoring protocols.

After the successful conclusion of the proof-of-concept phase, the program was incorporated as a non-profit organization and began operation in 2007. Today, the ABMI functions with engagement from the Government of Alberta, Canadian Association of Petroleum Producers, ConocoPhillips Canada Resources, Shell Canada, Suncor Energy, Pembina Institute, The Nature Conservancy, and Al-Pac, among others.

The ABMI measures and reports on the state of land, water, and wildlife across the province using scientifically credible indicators of environmental health. The ABMI measures and reports on a suite of carefully selected

indicators encompassing more than 2,000 species and habitats at 1,656 sites across the province. This includes the collection and management of knowledge on mammals, birds, plants, moss, lichen, soil mites, wetlands, fish, and the human footprint.

Data and knowledge generated by the ABMI are value-neutral, independent, and publicly accessible. The ABMI is a performance monitoring tool that enables the public and managers to establish clear and consistent ecological objectives, and to measure progress towards reaching those objectives. Knowledge produced by the ABMI is:

- Fundamental to the Land-use Framework and the Cumulative Effects Management System.
- An important component of Alberta's Energy strategy and Oils Sands strategy
- Used to fulfill Alberta's commitment to the National Forest Inventory.
- Key to the Water for Life strategy.
- Essential to ensuring a sustainable legacy for future generations.

The ABMI is already being integrated into more than 20 provincial programs including Alberta's Sustainable Resource and Environmental Management System and Environmental Impact Assessments, and is expected to be used to support various forest management certifications.

A MOLECULAR BIOLOGY LABORATORY TO STUDY HIV AND WNV PATHOGENESIS



Assistant Professor,
Department of
Microbiology,
Immunology &
Infectious Diseases

Dr. Guido van Marle

UNIVERSITY OF CALGARY

The infrastructure grant provided Dr. van Marle with the infrastructure to study the molecular mechanisms underlying the pathogenesis of both Human Immunodeficiency virus and West Nile virus.

With infrastructure support from the Research Capacity Program (RCP) in 2006, Dr. Guido van Marle has been able to study the molecular mechanisms that determine pathogenic outcomes of West Nile virus (WNV) and Human immunodeficiency virus type 1 (HIV-1). Generally, the West Nile Virus is transferred from birds to mosquitoes to humans. The virus can be fatal or very debilitating and there is no real treatment for it. Dr. van Marle's research has focused on how viruses cause disease, as well as the emergence of new varieties of these viruses. Similar to viruses such as influenza, WNV and HIV-1 continue to challenge researchers with the emergence of new strains that have different disease causing properties.

Dr. van Marle's research on HIV-1 focuses on the infection of the gut, which plays an important role in the development of Acquired Immune Deficiency Syndrome (AIDS); whereas, his research on WNV has aimed to determine how the virus causes neurological disease, in order to identify therapeutic approaches. To date, Dr. van Marle's research has demonstrated that the gut has different HIV varieties compared to other parts of the body, and drug resistance develops differently in the gut.

The infrastructure also adds valuable components to the various research activities (emerging infectious diseases and gastrointestinal diseases) ongoing at the Institute of Infection, Immunity and Inflammation, at the Faculty of Medicine of

the University of Calgary. These collaborations illustrate that the equipment represents a considerable asset to many members in the medical research community at the University of Calgary.

Through this infrastructure, Dr. van Marle is now ideally positioned to efficiently contribute to the medical research community at both the national and international levels. For example, the infrastructure enabled Dr. van Marle to establish collaborations and secure grants with other HIV researchers in Canada, as well as help develop a collaborative research and training program with HIV researchers in Addis Ababa and Gondar, Ethiopia.

Finally, the infrastructure acquired by Dr. van Marle has also had a positive effect on the recruitment and training of other researchers and technical personnel in the Faculties of Veterinary Medicine and Medicine at the University of Calgary. His research will allow for research training at all levels ranging from undergraduate students, technicians through to post-doctoral fellows. Personnel in van Marle's lab can expect preparation for future jobs in the exciting and constantly evolving field of viral pathogenesis.



**RESEARCH FACILITY FOR
ORGANOMETALLIC CHEMISTRY,
CATALYST DEVELOPMENT AND NEW
MATERIAL SYNTHESIS**



*Associate Professor,
Department of
Chemistry and
Biochemistry*

Dr. Paul G. Hayes

UNIVERSITY OF LETHBRIDGE

Dr. Hayes used the equipment grant to develop new ways to create materials with the aim of reducing production costs and unwanted byproducts that may impact the production of materials such as pharmaceuticals, electronics and farm chemicals.

Supported by the infrastructure funding from the Research Capacity Program (RCP), Dr. Hayes' research program has focused on the synthesis of high-energy and reactive inorganic molecules for application in novel chemical transformations and catalysis, including the preparation of new materials that are both biodegradable and biocompatible.

The Hayes group focuses on lowering the energy requirements for a chemical reaction by using catalysts that dramatically increase the rate of reaction and/or perform the reaction under much milder experimental conditions. These changes in reactivity have proven to be valuable to various production applications based on their potential to reduce production costs, reduce the potential for ecological impact, and enhance product and process safety and the potential for commercialization. Possible applications from this research include the production of agrochemicals, new materials, basic chemical feedstocks, pharmaceuticals and electronics.

Dr. Hayes' catalysis research program has potential for significant impact on key areas related to Alberta's strategic priorities of life sciences (biodegradable plastics, biomedical implants, matrices for the slow release of pharmaceuticals), the energy sector (alternative uses for conventional petrochemical products) and information and communications

technology (computer microchip development). For example, one research project pursued by the Hayes group aims to chemically activate inert hydrocarbon molecules (e.g., methane, ethane, octane) for direct incorporation into pharmaceutical and new material production.

More than 20 researchers have been trained in the Hayes lab over the past four years, the majority of whom have received prestigious institutional, provincial, or national awards. The RCP funded infrastructure has proven invaluable for improving recruitment and retention at the University of Lethbridge. Since the acquisition of this infrastructure, many new highly qualified people have been recruited, including three outstanding postdoctoral fellows, and several excellent graduate students.

As the principal investigator, Hayes has also been extremely successful at securing external funding and currently holds a Natural Sciences and Engineering Research Council Discovery Grant at the University of Lethbridge. Additionally, Hayes was the recipient of the 2010 Confederation of Alberta Faculty Associations (CAFA) Distinguished Academic Early Career Award.



Glove Box and Inert Atmosphere Workstations

FIELD FACILITY TO SUPPORT ECOSYSTEM MANAGEMENT EMULATING NATURAL DISTURBANCES (EMEND)



*Professor & Chair,
Department of
Renewable Resources*

Dr. John Spence

UNIVERSITY OF ALBERTA

Dr. Spence's research seeks to understand the impact forest harvest has on forest habitats, biodiversity, and forest regeneration in an effort to optimize forest management in relation to costs and long-term benefits.

The Ecosystem Management Emulating Natural Disturbance (EMEND) Project, one of the world's largest forest ecology experiments, is located 90 km northwest of Peace River in northwestern Alberta. In 2004, Dr. John Spence received Research Capacity Program (RCP) infrastructure funding support for the EMEND project, acquiring accommodations for 20 plus research staff, laboratory space, minor laboratory equipment (microscope, computer, etc.), two four-wheel-drive vehicles, and four ATV's for access to the field sites. This infrastructure established the backbone from which all research at EMEND is conducted.

EMEND is a long-term experiment addressing boreal ecosystem disturbances. The information generated at EMEND contributes to the development of management applications compatible with natural disturbance regimes, and offers critical data to address complex trade-offs faced in industrial forestry (e.g., productivity vs. biodiversity), supporting principles of Sustainable Forest Management (SFM). This experiment contributes significantly to Alberta's and Canada's leadership in SFM.

EMEND is perhaps the most wide-sweeping study of organism response (over 1,200 species to date) to forest management activities in Canada. These studies are conducted in the same experimental units where careful measurements of short and long-term forest productivity are carried out. To date, research at EMEND has indicated that use of variable

retention forestry practices are beneficial to forest biodiversity and many ecosystem processes.

The EMEND Research Facility offers a unique experience in training students to work in a truly collaborative fashion. Graduate student programs are enriched by the multidisciplinary context of the project and directed toward research of broad interest to society through the active interface with industrial foresters and other land managers.

The research facility at EMEND is essential to the recruitment and retention of research personnel. The primary expense in conducting forest ecology research is accommodations and travel of research staff to remote sites. This incentive has been cited as a main reason for several academic staff members to choose the University of Alberta to establish their careers. The study site and related infrastructure has also attracted more than 25 graduate students, including many international students, to Alberta since the research facility became operational. Additionally, two full-time research technicians have stayed with the project since 2005 and the undergraduate positions remain highly sought after.

**LABORATORY FOR ADVANCED
MATERIALS SCIENCE – FUEL CELLS,
SENSORS AND BATTERIES**



*Assistant Professor,
Department of
Chemistry*

Dr. Venkataraman Thangadurai

UNIVERSITY OF CALGARY

The RCP grant provided Dr. Thangadurai with state-of-the-art equipment for the investigation of materials for solid oxide fuel cells, proton exchange membrane fuel cells, sensors and batteries.

Dr. Thangadurai's 2006 Research Capacity Program (RCP) infrastructure grant has contributed to acquiring state-of-the-art infrastructure in the field of solid oxide fuel cells (SOFCs), proton exchange membrane fuel cells (PEMFCs), and solid state lithium ion batteries. This equipment is crucial to Alberta's successful contribution to the preparation and characterization of novel solid electrolytes and electrodes with desired functional properties for application in advanced low-temperature SOFCs, gas sensors, and lithium ion batteries.

The research performed in Dr. Thangadurai's lab demonstrates a clear alignment with Alberta's strategic priority of research development in the field of energy. As a result of the acquiring RCP infrastructure funding, the Thangadurai lab now has a large collection of energy research equipment and is rapidly contributing to research into alternative energy sources that will accommodate a shift from burning conventional fossil fuels and help control Alberta's carbon emissions.

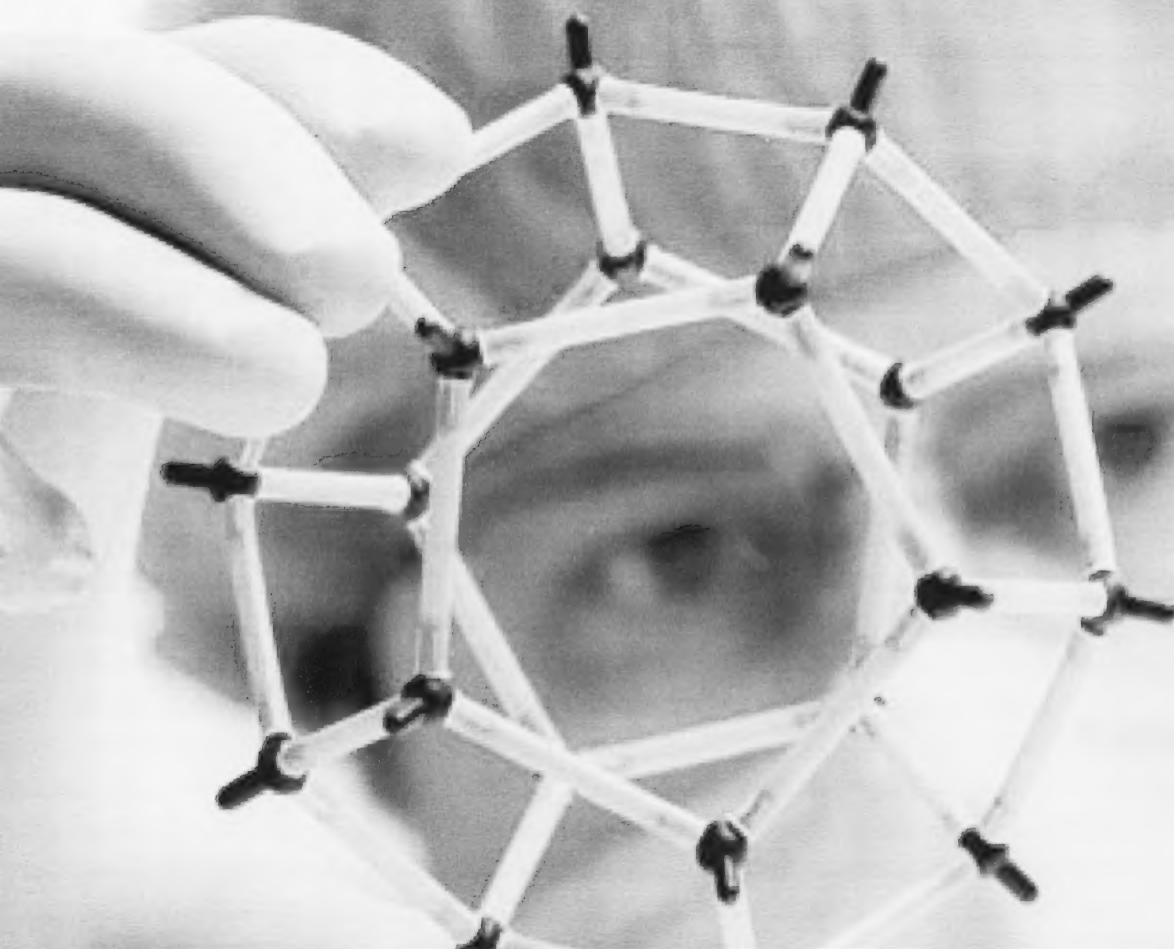
Researchers at the lab have access to an x-ray diffractometer to characterize crystal structure, scanning and tunneling electron microscopes to understand microstructure, and AC and DC impedance to detail the electrical properties of various materials. Researchers and students also have access to high temperature furnaces, diamond saws, and polishing equipment to successfully synthesize and prepare their new

materials.

Acquiring the new infrastructure for the Laboratory for Advanced Materials Sciences has been extremely important to the training of highly qualified people in a broader area of applied physics and chemistry. Fifteen graduate and undergraduate students have had the opportunity to benefit from this technology. Technologies in Dr. Thangadurai's lab are also widely used by other fields, allowing students the opportunity to collaborate with colleagues studying other disciplines—increasing the flow of knowledge among students. As a result, these technologies have played a significant role in the successful publication records of the students using the equipment for research.

In addition, Dr. Thangadurai has established strong collaborations with Dr. Shimizu and Dr. Birss, in the University of Calgary Chemistry Department. Collaborations with Dr. Shimizu involve work on engineering new solid-state ceramic proton conductors based on novel inorganic sulfate and phosphate framework structured materials for PEMFCs and gas storage applications. Dr. Shimizu has recently filed a provisional patent on proton conductors derived from metal organic polymer materials. Collaborations with Dr. Birss include the development of positive electrode materials for SOFCs.

RCP PROJECT LISTING: FIVE YEARS OF INVESTMENT



RESEARCH INFRASTRUCTURE STREAM AND INFRASTRUCTURE SUSTAINABILITY STREAM

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved
09-105-RI	Geomechanical/Reservoir Experimental Facility (GeoREF)	The GeoREF will provide the tools to gain critical knowledge of the behavior of oil sands, shale, and carbonates during thermal recovery processes. Research outcomes from the GeoREF will underpin the technology for carbon storage projects and support the sustainable, safe development of Alberta's unconventional hydrocarbon resources, including coal gasification.	 <u>Rick Chalaturnyk</u>	University of Alberta	\$4,078,511	\$1,630,061
09-107-RI	Ultraclean Isotope Analysis Facility for Innovative Geo-chronology	Dr. Creaser and his research team are world leaders in isotope geochemistry. The infrastructure provides the needed tools for innovative geochronology research in areas relating to energy and natural resources. The Isotope Analysis Facility will enable researchers to provide the scientific underpinning which guides industry in their efforts to explore and make use of mineral and petroleum resources.	 <u>Robert Creaser</u>	University of Alberta	\$1,292,627	\$517,051
09-208-RI	The Resolute Bay Incoherent Scatter Radar: A Space Science Initiative in Nunavut	The award will build a world-leading facility for direct ionospheric observations in Canada's North which will operate synergistically with a facility in the U.S. Arctic. RISR will enable researchers to study the significant effects of space weather on satellite and aircraft communication and navigation systems and its longer term effects on the environment and climate change. The RISR provides the Calgary region with commercialization opportunities in global navigation satellite systems, GPS accuracy, and new technologies to rapidly access remote data.	 <u>Eric Donovan</u>	University of Calgary	\$24,343,381	\$7,128,810
09-212-RI	Rapid and Secured Communication Network for Exchange of Medical Images in the Canadian Atherosclerosis Imaging Network (CAIN) - CFI National Award	CAIN is one of the leading national collaborative networks in Canada. The research infrastructure will create a rapid and secure communication network, state-of-the-art image management and analysis software, and innovative imaging technologies. This technology will enable the sharing of clinical and research data across the country to improve the diagnosis and treatment of heart disease.	 <u>Richard Frayne</u>	University of Calgary	\$3,043,418	\$1,217,367
09-216-RI	Canadian Longitudinal Study on Aging	The equipment purchased will enable the development of a tremendous source of long-term information which will be used to answer basic research, clinical, and population health questions. The award provides the equipment to collect health measurements from patient participants and the computational resources to share the data securely across this national network of researchers. The high quality of the data will allow researchers to address complex population health and policy questions related to an aging population which were otherwise not feasible.	 <u>David Hogan</u>	University of Calgary	\$957,552	\$383,021
09-117-RI	Subzero Facility for Processing and Analysis of Hydrocarbons in Pristine Planetary Samples	A unique facility will be built in Alberta so that researchers may store, process, and handle pristine astromaterials, including meteorites. The facility will protect the valuable samples from any further earth-based contamination that they could receive. This new facility will also support the work of Dr. John Shaw, NSERC Industrial Chair in Petroleum Thermodynamics at the University of Alberta.	 <u>Christopher Herd</u>	University of Alberta	\$434,005	\$173,602

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved
09-220-IS	emSYSCAN: Embedded Systems Canada	emSYSCAN is a national embedded computer-ized systems initiative. The infrastructure will allow researchers to meet the challenge of the global shift from discrete chip-based electronics products to those that implement complete systems on a single computer chip. The network enables prototype development and provides access to a library of system components and computer-aided design tools through secure internet communication links. The research is closely linked to industry to enable rapid commercial deployment of new applications in the fields of information and computer technology, medicine, and biotechnology.	 Karan Kaler	University of Calgary	\$3,813,875	\$1,525,551
09-122-RI	Cell and Tissue Innovative Research Centre (CTIRC)	The funding will support the development of a specialized centre capable of producing clinical grade cells and tissues to treat a wide variety of chronic and acute diseases and injuries. The Centre will focus on developing insulin-producing cells for the treatment of diabetes, skin treatment for burn victims, and developing new treatments for people with lung disease. This type of facility will enhance and accelerate the possibility of developing commercial and clinical applications in Alberta.	 Gregory S Korbitt	University of Alberta	\$26,509,863	\$10,603,945
09-224-RI	ACWA: Advancing Canadian Wastewater Assets	The ACWA Research Facility will integrate engineering, chemical, and biological expertise with a full-scale research approach to address wastewater treatment and environmental water issues in Alberta. The ACWA initiative is an innovative collaboration with the City of Calgary's Pine Creek Wastewater Treatment Plant, through which scientists will investigate and demonstrate new technologies to treat contaminants and minimize their impacts on aquatic ecosystems and public health.	 Edward McCauley	University of Calgary	\$29,506,447	\$10,373,152
09-128-RI	ENVIRO-NET: Sensing our Changing Environment	The ENVIRO-NET infrastructure will provide unique research opportunities in sensor design, networking and communication, data mining, storage, retrieval, management, and analysis. The infrastructure will use integration of carbon flux measurement instruments and advanced GPS applications aimed at monitoring the response of boreal forests to industrial development and other climate change indicators. The infrastructure will position the University of Alberta as one of the key players worldwide in the design and implementation of wireless sensor networks for environmental monitoring and assessment.	 Arturo Sanchez-Azofeifa	University of Alberta	\$1,816,200	\$726,480
09-329-RI	Southern Alberta Group for Epigenetic Studies (SAGES) - Epigenetic Regulation of Cell Memory and Stress Responses	Epigenetics is the study of changes in appearance or gene expression that are not related to changes in the DNA sequence. This award will bring together researchers in the institution's areas of strength (neuroscience and molecular biology) to lead in this emerging area of research. SAGES will enable scientists to make major new discoveries related to improved understanding and treatment of human disease (e.g., cancer, Parkinson's Alzheimer's), new biofuel models, and environmental toxicology, to name a few.	 Robert Sutherland	University of Lethbridge	\$8,108,014	\$2,816,548

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved
09-132-RI	Instrumentation for Molecular Breeding for Specialty Oils	The award will support the development of specialty oilseed crops, such as canola and flax for the production of enhanced oils for human health and nutrition. The integration of plant biotechnology and nutritional science will optimize the impact of the research. The project will strike a balance between scientific push and industrial pull to add value to Alberta's traditional crops.	 <u>Randall Weselake</u>	University of Alberta	\$5,830,110	\$2,329,057
09-235-RI	Regeneration Unit in Neurobiology (RUN)	The focus of this award is to provide the neurobiology research team with the tools required to apply innovative approaches to study the possibility of regeneration after major nerve and spinal cord injuries. The facilities will be amongst the best in the world and, in the hands of this strong team, will accelerate the development of new treatments for people with nerve and spinal cord injuries.	 <u>Douglas Zochodne</u>	University of Calgary	\$3,240,933	\$1,296,372
09-137-IS	Enhancing the Science: Polarized Photons and Improved Endstations for the SGM and PGM at the Canadian Light Source	The Canadian Light Source (CLS) award brings an already productive photon tool to the leading edge of light source imaging. The tool will enable researchers to view various materials, nanostructures, catalysts, and biological tissues. Research conducted at the facility is interdisciplinary and will impact many sectors, including agriculture, health, ICT, materials, mining, oil and gas, and pharmaceutical sciences.	 <u>Jonathan Veinot</u>	University of Alberta	\$4,047,255	\$150,943
09-138-IS	The Canadian Writing Research Collaboratory	The infrastructure will create a virtual online "lab" that will transform the study of Canadian writing by facilitating data sharing and analysis, networking, and collaboration for scholars worldwide, and establish a major open-access resource on Canadian writers and writing. It will enhance Alberta's information and communication technology infrastructure by providing a model for geographically distributed teams to work effectively to create high-quality knowledge resources for research, policy development, and industry collaboration.	 <u>Susan Brown</u>	University of Alberta	\$2,640,786	\$1,049,608
09-440-IS	Athabasca University Geophysical Observatory Upgrades of Research Infrastructure (AUGOURI)	The infrastructure will enhance the Athabasca University Geophysical Observatory and in turn strengthen and expand the AUGOURI's international collaborations with the world's leading space scientists. The research observatory will study the radiation belts that surround the planet, the northern lights, and their relation to an unknown mechanism called "substorms" which are able to interrupt electrical power grids on the earth.	 <u>Martin Connors</u>	Athabasca University	\$1,852,864	\$712,261
09-142-RI	Alberta Particle Astrophysics Experiments at SNOLAB: SNO+ and DEAP/CLEAN	The SNOLAB project will keep Canada and Alberta at the international forefront of neutrino and dark matter physics. SNOLAB is a national research project, with strong international ties, to measure properties of particles that are critical to the formation and evolution of the universe. While the research is fundamental, there is long-term potential for contributions to understanding basic energy generation in the sun, which impacts our climate systems and models.	 <u>Aksel Hallin</u>	University of Alberta	\$3,774,593	\$1,509,837

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved
09-144-IS	New Control System for MTS Hydraulic Testing Machine - Part of CFILF Application: Centre for Industrial Application of Microcellular Plastics	The Centre will develop innovative products and processing technologies for microcellular plastics, a new generation of materials that exhibit superior mechanical performance and significantly improve their sound and thermal insulation properties. Researchers at the University of Alberta will provide fatigue resistance testing and evaluation of the new microcellular plastics.	 P-Y Ben Jar	University of Alberta	\$108,584	\$43,433
				TOTAL	\$125,399,018	\$44,187,099

SMALL EQUIPMENT GRANTS STREAM PROJECT LIST 2006-2010

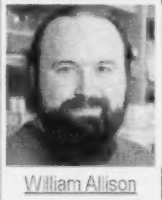
Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
07-001-SEG	Fabrication and Testing Facilities for Carbon Nanotube-based Devices and Circuits	Dr. Chen will purchase equipment that will allow him to build accurate and sensitive carbon nanotube-based devices and circuits with carbon nanotubes a very promising and tiny building material. The carbon nanotube structures could be of benefit in biomedical areas such as in the development of small yet robust and sensitive devices for diagnosis and treatment of diseases such as cancer. Carbon nanotube circuits could bring energy savings to consumer electronics and could replace the silicon processing chip in computers.	 <u>Jie Chen</u>	University of Alberta	\$560,232	\$168,070
07-002-SEG	Novel Reservoir Simulation Using Parallel and Hardware Acceleration	Dr. Gates' award will fund the development of a next-generation reservoir simulator that will evaluate oil and gas resources and determine more efficient ways to develop, maintain, and produce a given reservoir. His new approach to reservoir simulation would incorporate more chemical and physical factors and use more computing power. Dr. Gates' reservoir simulator will be the first of its kind in Canada.	 <u>Ian D. Gates</u>	University of Calgary	\$601,512	\$168,983
07-004-SEG	Tools for Molecular Simulations of Crystal Growth	Dr. Kusalik will establish a computational laboratory to simulate crystal growth, an area of research with many applications. For example, fundamental knowledge about the formation and dissolution of crystals could have industrial applications in several energy-related sectors, including methane recovery, carbon dioxide sequestration and flow assurance in pipeline networks. Dr. Kusalik will also investigate basic questions about ice crystal growth to improve understanding of atmospheric processes, make better climate models and improve weather forecasting.	 <u>Peter Kusalik</u>	University of Calgary	\$1,182,327	\$250,000
07-005-SEG	Quantum Cryptography and Communication Laboratory (QC2Lab)	Dr. Tittel will purchase equipment to develop a more secure Alberta-wide communication network through the use of quantum cryptography. Quantum cryptography offers security which is guaranteed by the laws of nature, meaning this security cannot be compromised by new technologies. By establishing a quantum cryptography and communication laboratory the University of Calgary positions itself to become a world leader in information security.	 <u>Wolfgang Tittel</u>	University of Calgary	\$2,092,147	\$627,644
07-006-SEG	Development of a yeast facility for the study of lipid metabolism and lipid mediating signalling	Dr. Zaremborg will purchase specialized equipment to help in the study of natural fats, or lipids, and their role in healthy and diseased cells. This basic research may have important consequences in biomedical research pertaining to drug development and treatment of lipid-related diseases.	 <u>Vanina Zaremborg</u>	University of Calgary	\$206,291	\$61,888
07-008-SEG	Laboratory for the Synthesis and Characterization of Phosphoorganic and Organometallic Materials for Molecular Electronics, Optoelectronics and Catalysis	Dr. Baumgartner experiments with using organic compounds to build molecular electronic devices that can be used for applications such as light-emitting diodes (LEDs). The SEG award will be used to purchase specialized equipment which will allow Dr. Baumgartner to investigate new compounds for electronics applications.	 <u>Thomas Baumgartner</u>	University of Calgary	\$277,069	\$83,121

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
07-009-SEG	Measuring Communication between the Endoplasmic Reticulum (ER) and Mitochondria with Novel Fluorescent Probes in Live Cells	The project aims to observe the communication between two intracellular organelles, the endoplasmic reticulum and mitochondria, <i>in vivo</i> . This communication is a major determinant of cellular fate and often malfunctions in cancer tissue or upon neurodegeneration.	 <u>Thomas Simmen</u>	University of Alberta	\$674,024	\$202,207
07-011-SEG	A Glycoengineering Laboratory	Dr. Feldman will purchase dedicated lab equipment to investigate new treatments for autoimmune diseases and cancer by using bacteria to make the active components. Dr. Feldman is a member of the Alberta Ingeruity Centre for Carbohydrate Science (AICCS) where his research group's work complements and extends the applications of Alberta's internationally recognized team of carbohydrate researchers.	 <u>Mario Feldman</u>	University of Alberta	\$425,741	\$127,722
07-012-SEG	Establishment of a Facility for Molecular and Cellular Analysis in Pharmacy and Pharmaceutical Sciences	Dr. Seubert's SEG award will be used to purchase dedicated lab equipment for the investigation of the cardioprotective characteristics of naturally occurring compounds, with the aim of protecting the heart from stress related injury and developing new treatments for heart disease.	 <u>John Seubert</u>	University of Alberta	\$394,786	\$118,442
07-015-SEG	Hybrid Device Facility for Molecular Electronics	Dr. McCreery will develop a facility within the National Institute for Nanotechnology that will accommodate the unique requirements for making and studying molecular electronics, which is when molecules are used as circuit components within electronic devices. The hybrid device facility will be used as the core of Dr. McCreery's research group's needs, but will also be available to other researchers, becoming an important asset of the whole nanotechnology base being built in Alberta.	 <u>Richard McCreery</u>	University of Alberta	\$874,160	\$262,248
07-017-SEG	Environmental Stress and Hydraulic Limits on Tree Performance: The Ecophysiology of Adaptation to Stress	Dr. Tyree will purchase equipment to study cold and drought stresses in an important Alberta tree species, the poplar. By identifying the characteristics in a tree which make it particularly well adapted to stress, Dr. Tyree will give the forestry industry important information to use in tree-improvement breeding programs.	 <u>Melvin T. Tyree</u>	University of Alberta	\$537,604	\$161,281
07-018-SEG	Single Molecule Fluorescence Laboratory for Probing Plasma Membrane Enzymology in Single Cells Using Chemical and Spectroscopic Tools	Dr. Cairo will use the SEGP award to establish a specialized laboratory that is able to observe the movement of individual molecules within a living cell. Dr. Cairo intends to develop new fluorescence tags for components of the living cell so that we may discover more about its dynamics. Researchers trained in Dr. Cairo's program will become valuable assets in Alberta's life sciences sector, as the technology is used in pharmaceutical research, development of new diagnostics for disease, and the chemical industry.	 <u>Christopher W. Cairo</u>	University of Alberta	\$619,588	\$185,876

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
08-001-SEG	Women and Exercise: Infrastructure for Understanding a Complex, Integrative Physiology	Dr. Billaut's research addresses the question of sex differences in skeletal muscle fatigue. The neuromuscular and metabolic functions will be originally studied, and the role of a revolutionary model of muscle fatigue will be envisaged. His multi-disciplinary investigations will provide crucial information on the female physiology to enhance health and sport performance.	 <u>Francois Billaut</u>	University of Lethbridge	\$289,032	\$86,710
08-002-SEG	Infrastructure for Molecular Evolutionary Ecology Laboratory	New equipment to examine genetic changes in Alberta's bird populations, and using this information to discover how bird populations respond to changes in their environment. Government and industry can use the information to develop policies to support sustainable development and to protect wildlife in Alberta.	 <u>Theresa Burg</u>	University of Lethbridge	\$197,928	\$59,378
08-003-SEG	Research facility for organometallic chemistry, catalyst development and new material synthesis	Dr. Hayes will use the equipment to develop new ways to create materials with the aim of reducing production costs and unwanted byproducts that may impact the production of materials such as pharmaceuticals, electronics and farm chemicals.	 <u>Paul Hayes</u>	University of Lethbridge	\$297,802	\$89,341
08-004-SEG	Molecular Mechanisms of Small Ribonucleoproteins	New research infrastructure addresses the function and structure of small ribonucleoproteins, essential cellular complexes consisting of RNAs and proteins. Kothe's multi-disciplinary investigations will provide crucial information on the building principles of cellular machines and the molecular causes of diseases.	 <u>Ute Kothe</u>	University of Lethbridge	\$329,440	\$98,832
08-005-SEG	An Immunobiology Laboratory for Analysis, Purification, and High Throughput Automated Screening of Immune Cells and their Receptors	Dr. James Stafford will use the grant funds to establish a biological laboratory to study aspects of the fish immune system that help to remove virus-infected cells and tumours. His collaborations with biomedical researchers will help to transfer the research results to investigations of human immunotherapy.	 <u>James L. Stafford</u>	University of Alberta	\$412,877	\$123,863
08-006-SEG	The regulation of microtubule dynamics and microtubule-based processes in living cells	Dr. Martin Srayko will buy a state-of-the-art microscope and other supporting equipment to get a detailed view of the internal structure and dynamics that control a cell's shape. The research will contribute to the basic understanding of cell division, an important aspect of cancer research.	 <u>Martin Srayko</u>	University of Alberta	\$866,303	\$90,000
08-007-SEG	Integrative Genomics in Forest Trees: Scaling from Molecular to Ecophysiological Processes	Genomics technologies can be used in forestry to discover genes that regulate important processes such as wood production, how trees prepare for winter, or how they defend themselves against pests like the mountain pine beetle. Diagnostic genetic markers developed using genomics have applications in tree improvement and ecological monitoring.	 <u>Janice Cooke</u>	University of Alberta	\$355,726	\$106,718

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
08-008-SEG	The role of the tumor suppressor protein, RASSF1A, in cancer and inflammation	Dr. Baksh will use the award to purchase specialized equipment to study the molecular mechanisms of inflammation. Dr. Baksh's research could lead to earlier cancer detection and a better understanding of possible genetic links to Crohn's disease.	 Shairaz Baksh	University of Alberta	\$368,786	\$103,256
08-009-SEG	Non-genetic cell phenotype variability in cell fate commitment and tumor progression	Dr. Huang will purchase equipment to investigate why genetically identical cells within a group of cells behave differently. This research may help to better understand cancer and stem cell behaviour and contribute to the field of regenerative medicine.	 Sui Huang	University of Calgary	\$785,811	\$235,743
08-010-SEG	The Andrology Research Centre for the study of regulation of sperm function and its contributions to early embryo development	The purpose of this proposal is to develop a world-class Andrology Research Centre for studying the regulation of male fertility with the long-term goal of developing an innovative approach for identifying fertile bulls at their earliest possible age and advancing knowledge relevant for understanding male-factor infertility at an interdisciplinary level.	 Jacob Thundathil	University of Calgary	\$636,400	\$190,920
08-011-SEG	Alberta Bone and Joint Health Technology Assessment Decision Support Laboratory	Using health technology assessment in a practical iterative framework to inform evidence-based treatment and policy decisions about those suffering with bone and joint conditions. This research will lead to the development of new evidence-based approaches to improve the quality and efficiency of bone and joint care.	 Deborah Marshall	University of Calgary	\$293,760	\$88,128
08-012-SEG	CCBN Imaging Centre Upgrade	Dr. Robert Sutherland will purchase specialized equipment to enhance the overall use of the imaging equipment, enabling the CCBN researchers to operate their suite of equipment at a lower cost, improve imaging capabilities, and ensure that this internationally recognized research team remains at the forefront of their field.	 Robert J. Sutherland	University of Lethbridge	\$523,930	\$157,170
08-013-SEG	<i>In vivo</i> imaging laboratory	Dr. Catherine Chan will purchase <i>in vivo</i> imaging equipment that can be used for multiple fields of medical research, especially diabetes. The specialized equipment enables the researcher to relate results from a living system to earlier results discovered in tissue culture, making the imaging laboratory a powerful tool for Alberta's diabetes researchers.	 Catherine B. Chan	University of Alberta	\$360,826	\$108,247
08-015-SEG	The contribution of reactive glia to central neuropathic pain	New equipment to research chronic pain, particularly the neuropathic pain related to multiple sclerosis and spinal cord injuries, at the molecular and cellular levels. Dr. Kerr's lab will offer valuable training experience to graduate students and postdoctoral fellows for Alberta's biotechnology sector.	 Bradley Kerr	University of Alberta	\$312,100	\$93,630

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
08-016-SEG	Study of regulatory pathways controlling lipid and cholesterol metabolism in <i>Drosophila</i>	Dr. Kirst King-Jones will use the grant to purchase equipment for research in lipid metabolism, which supports human growth, development and health. By using genomic and fluorescent microscopy techniques, he will identify important genes related to metabolic processes, and especially those that are involved in the regulation of fat, sugar and energy.	 <u>Kirst King-Jones</u>	University of Alberta	\$344,826	\$103,448
08-017-SEG	Thermal-sprayed nano-structured Coatings for Equipment in the Natural Resource Sector	Dr. André McDonald will purchase specialized tools to make and test nanostructured titania coatings on gas pipelines and other mechanical equipment in order to prevent rust damage. He aims to bring the technology to commercialization, helping Alberta's oil and gas industry combat corrosion cracking and oil sand slurry wear.	 <u>André G. McDonald</u>	University of Alberta	\$332,741	\$99,822
08-019-SEG	Optical instrumentation for the investigation of industrial flows related to oil sand and energy production	Advanced optical instrumentation, tomographic particle image velocimetry (TomoPIV) will be used to investigate flow problems and phenomena related to the production of oil sand. This measurement system combined with a unique flow facility under development will allow fundamental and applied research and will be a one-of-a-kind in the world.	 <u>David S. Nobes</u>	University of Alberta	\$283,293	\$84,989
08-021-SEG	Scientific Computing Infrastructure for CO2 Injection Enhanced Oil Recovery	Dr. Chen will purchase computing infrastructure to allow him to make highly detailed computer simulations of CO2 sequestration and improve the efficiency of oil recovery from reservoirs. Dr. Chen's research will help in the global effort to find solutions to minimize greenhouse gas emissions.	 <u>Zhangxing (John) Chen</u>	University of Calgary	\$1,171,878	\$351,563
08-022-SEG	Development of a cell biotechnology suite to evaluate functional feeds and their impact on animal immunity and health	Dr. Barreda will use the award to purchase the tools he needs to test various fractions of Alberta crops, including barley, for their positive impact on livestock health. His research offers the potential for Alberta's agricultural sector to find added value from the crops they produce.	 <u>Daniel R. Barreda</u>	University of Alberta	\$420,537	\$126,161
08-023-SEG	New Imaging Technologies to Study Immune Receptors at the Single Molecule Level	The new research focuses on gaining a better understanding of our immune system's ability to protect us against fungal infections. Dr. Touret's research may lead to strategies that prevent fungal infections, and his techniques and the new equipment offer an excellent research and training opportunity in advanced imaging techniques for his colleagues and students.	 <u>Nicolas Touret</u>	University of Alberta	\$919,175	\$225,720
08-024-SEG	Low Background Counting Facility at the University of Alberta	Dr. Krauss will purchase equipment for research in the area of astroparticle physics. He will build unique and highly sensitive detectors which will improve the search for dark matter, a search that is an international effort. Dr. Krauss's research contributions are of high international significance and build upon Canada's recognized strengths in the field of astroparticle physics.	 <u>Carsten Krauss</u>	University of Alberta	\$200,000	\$60,000

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
08-025-SEG	Comprehensive multi-dimensional gas chromatography - time-of-flight mass spectrometry facility for advanced research in gas-phase separation science	Dr. Harynuk will purchase specialized equipment that allows him to measure small amounts of compounds in samples that would otherwise be difficult to measure using conventional methods. His research and expertise in analytical chemistry can be applied to many areas, including analysis and new techniques related to tailings mixtures from the oil and gas industry, agricultural products, and health research.	 <u>James Harynuk</u>	University of Alberta	\$377,065	\$90,000
08-026-SEG	The integration of development, genetics, and phylogenetics to understand mechanisms underlying diversity of important fruit and floral traits in plants	Dr. Hall will purchase equipment that allows her to investigate and compare the genetic connections between canola, and a related and well-studied plant, Arabidopsis. In particular, she will study the genetic control of flower and fruit development in plants that share the same family as canola, which may lead to the development of better control strategies for early pod shattering. In using a genetic approach, Dr. Hall will introduce important molecular techniques to the next generation of researchers.	 <u>Jocelyn Hall</u>	University of Alberta	\$301,836	\$90,551
09-001-SEG	Airborne electromagnetic sea ice thickness sensor	Airborne electromagnetic sea ice thickness sensor - Acquiring this equipment will improve the ability to accurately measure and monitor ice thickness changes, providing valuable insight into how sea ice levels may indicate changes in the climate.	 <u>Christian Haas</u>	University of Alberta	\$401,250	\$100,000
09-002-SEG	Laboratory for passive seismic imaging of earth processes	Laboratory for passive seismic imaging of earth processes - This award is to develop a laboratory for passive seismic imaging of the earth's processes which will use naturally occurring mini earthquakes as a source of seismic waves instead of artificial methods such as dynamite or air guns. Equipping this laboratory offers the opportunity to advance a wide range of areas including earthquake hazard analysis, CO2 capture and storage, oil recovery efficiency and the earth's physical evolution.	 <u>David Eaton</u>	University of Calgary	\$808,090	\$303,236
09-004-SEG	A transgenic zebrafish facility to study prion proteins, neurodegenerative disease and photoreceptor regeneration	A transgenic zebrafish facility to study prion proteins, neurodegenerative disease and photoreceptor regeneration - the award will advance the study of prion function and retinal degenerative disease as Zebrafish share similar genetic material with mammals and are useful models for studying human diseases. Such research will potentially assist in the detection and treatment of BSE, CWD, Creutzfeldt-Jakob disease and retinal degenerative diseases such as macular degeneration.	 <u>William Allison</u>	University of Alberta	\$206,265	\$81,050
09-005-SEG	Post-translational modifications and the proteome during Apoptosis	Post-translational modifications and the proteome during Apoptosis The funding for purchase of a high definition mass spectrometer system will further the understanding of Multiple Myeloma, a form of cancer of the plasma cells. The research aims to generate insight into cancers that appear to be resistant to conventional treatments. This research may lead to the discovery of more effective treatments for these cancers.	 <u>Richard Fahlman</u>	University of Alberta	\$984,205	\$393,682

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
09-006-SEG	Development of a comprehensive platform for the value-added utilization of poultry products	Development of a comprehensive platform for the value-added utilization of poultry products - The funding to complement the value-added poultry program at the University of Alberta. Some of Dr. Wu's research projects include an egg biorefinery which intends to develop ways to make use of all parts of the egg from the shell to the yolk. A value-added meat program is also incorporated into this award, and will attempt to determine ways to increase the nutritional value of poultry and overall efficiency of the poultry industry. These initiatives will assist in strengthening Alberta's agriculture industry and may develop products which will increase the health of Albertans.	 Jianping Wu  Mirko Betti  Robert Renema	University of Alberta	\$341,182	\$120,000
09-007-SEG	Quantitative photoacoustic imaging technology development	Quantitative photoacoustic imaging technology development - The award will assist in developing a new molecular imaging technology to generate images, such as the amount of oxygen that a body tissue uses, to monitor the development of diseases such as cancer and heart disease, as diseased tissue uses less oxygen than healthy tissue.	 Roger Zemp	University of Alberta	\$373,981	\$135,000
09-008-SEG	Obesity Research Laboratory	Obesity Research Laboratory - Equipment purchased will further the study of the role of gastrointestinal signals in regulating food intake, which aims to better understand the complex nature of obesity and the physiological mechanisms that play a key role in obesity in both humans and animals. Dr. Chelikani's laboratory will be a powerful tool in designing future programs for the treatment and prevention of obesity.	 Prasanth Chelikani	University of Calgary	\$1,140,695	\$456,278
09-009-SEG	Functional Genomics Laboratory for deciphering gene-regulatory and genetic-interaction networks	Functional Genomics Laboratory for deciphering gene-regulatory and genetic-interaction networks - This award will help equip a laboratory for functional genomics which includes an SGA (synthetic genetic array) suite and a microarray suite. With these tools, Dr. Chua aims to uncover and better understand the genetic origin of many human diseases.	 Gordon Chua	University of Calgary	\$1,186,860	\$474,745
09-010-SEG	A microbiological culture and biochemistry laboratory for carbohydrate research	A microbiological culture and biochemistry laboratory for carbohydrate research - The award supports exploring a novel approach to the treatment of cancer and other infectious diseases that combines the areas of organic chemistry and microbiology. This research has the potential to impact the area of vaccination and the treatment of cancer and infectious diseases through the study of the interaction between carbohydrates and proteins, which plays a role in conditions such as cancer, viruses, autoimmune diseases and inflammation.	 Chang-Chun Ling	University of Calgary	\$877,460	\$350,983

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
09-011-SEG	Laboratory for computational structural biology: Theoretical gateway to molecular origins of selective ligand binding to membrane proteins	Laboratory for computational structural biology: Theoretical gateway to molecular origins of selective ligand binding to membrane proteins - This award will help develop a greater understanding of how proteins on the cell surface or on a membrane within a cell bind to other molecules, which may become a powerful tool for advancing the effectiveness of therapeutic drugs and may provide insight into new methods of drug delivery.	 <u>Sergei Noskov</u>	University of Calgary	\$756,419	\$194,352
09-012-SEG	Mass spectrometry for elucidation of glycan structure and post translation modification of proteins in glycobiology	This award will be used to purchase a specialized mass spectrometer to boost capability to investigate the chemical biology of carbohydrates. This new equipment will also be made available to other researchers interested in glycobiology. The aim is to broaden the basic understanding of glycobiology, as well as to develop carbohydrate-based vaccines and therapeutics.	 <u>David Bundle</u>	University of Alberta	\$973,162	\$369,776
09-013-SEG	Bioenergy and the uncultured microbial majority	This award will help establish a new environmental microbiology laboratory at the University of Calgary to further the understanding of how microbial species and novel biotechnological applications of bacteria might advance the use of microbial activity for important environmental and industrial needs.	 <u>Peter Dunfield</u>	University of Calgary	\$834,328	\$329,393
09-015-SEG	Harnessing leading edge technology for osteoarthritis therapeutics; unprecedented resolution of cartilage cell signaling and macromolecular interaction with synovial fluid	Many Canadians suffer from osteoarthritis, a disease characterized by the wearing away of cartilage and a decrease in the amount of protective synovial fluid in the joint. This award will support the purchase of a highly sensitive confocal microscope that allows researchers to observe live cells and molecules for longer periods of time compared to earlier confocal technology. The equipment will be used to investigate potential new treatments for osteoarthritis and the research will contribute to providing a long term solution for people living with osteoarthritis.	 <u>Wayne Giles</u>  <u>Andrea Clark</u>  <u>Tannin Schmidt</u>	University of Calgary	\$1,283,400	\$513,360
09-017-SEG	Microfocus X-ray Diffractometer	The grant will modernize equipment to improve the quality of x-ray data collected at the University of Calgary. The research is focused on the development of potential antiviral medications and treatment options for norovirus gastroenteritis and similar diseases.	 <u>Kenneth Ng</u>	University of Calgary	\$722,019	\$288,808

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09-019-SEG	Nano/micro-encapsulation of nutraceuticals and bioactives for functional foods	Researchers will combine their expertise in nano-technology and food science in order to develop new food ingredients with superior properties. The award will support the purchase of equipment to help in the study of using Alberta crops, such as barley and flax, to produce high-value ingredients which deliver nutraceuticals into foods, creating functional food products. The research has the potential to boost the value of Alberta crops, and improve the nutritional value of processed foods.	 Marleny Aranda Saldana  Jonathan M. Curtis  Lingyun Chen	University of Alberta	\$432,484	\$168,700
09-020-SEG	In vivo evaluation of immune tolerance	The award will help improve the study of autoimmune disorders through further understanding of the role of the thymus in this regulatory process. It is anticipated that this new knowledge will have an impact on the fields of organ transplantation and chronic infections such as Hepatitis B and C, and HIV.	 Troy Baldwin	University of Alberta	\$150,700	\$60,280
09-021-SEG	Molecular Signatures Platform to Characterize Aggressive and Indolent Prostate Cancer	The project aims at identifying biomarkers for aggressive prostate cancer that could be implemented clinically prior to treatment. Researchers will investigate the most promising genes and their secreted proteins as tissue and serum biomarkers using automated high-throughput tissue and proteomics scanning systems.	 Tarek Bismar	University of Calgary	\$160,001	\$64,000
09-022-SEG	From the microcirculation to whole-body function: laboratories to investigate the effects of aging and physical activity on vascular control and functional capacity	This award will assist in establishing a laboratory designed to further understand the relationships between aging and physical activity on blood vessel regulation and will explore physical activity as a treatment option to slow down or reverse the degradation of arterial blood vessels.	 Darren DeLorey	University of Alberta	\$435,052	\$174,000
09-023-SEG	Laboratory for the development and in situ characterization of complex solid/liquid interfaces: from biomimetic materials to greener catalysts	The award will be used towards equipment to investigate the bonding of small molecules or ions in solution to surfaces and has the potential to impact many areas, including antibiotic resistance and the development of new catalysts for the energy and ICT sectors.	 Julianne Gibbs-Davis	University of Alberta	\$652,600	\$240,000
09-024-SEG	Infrastructure for the air quality characterization and control research laboratory	Dr. Hashisho aims to develop new technologies and materials to better control air quality. One particular area of concern is the emission of volatile organic compounds (VOC's) which pose serious health and environmental implications. VOC's are emitted from sources such as paints, furniture, flooring materials, perfumes, and petrochemical-based materials. The infrastructure purchased will assist Dr. Hashisho in creating new, cost-effective ways of controlling these emissions.	 Zaher Hashisho	University of Alberta	\$361,801	\$125,000

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09-025-SEG	Structural and functional study of membrane proteins in disease	This award will help develop a modern membrane protein expression, purification, and crystallization facility with equipment capable of investigating how the functions of membrane proteins contribute to diseases such as Type 2 Diabetes, blindness, and Alzheimer's. The findings from preliminary research may lead to further developments in novel treatment options for these diseases.	 <u>Joanne Lemieux</u>	University of Alberta	\$569,641	\$227,856
09-026-SEG	Establishment of a facility to study carcinogen metabolism and transmembrane transport	The award will help further investigate cellular metabolism, focusing on the transport of carcinogens across cell membranes. The research will study arsenic and tobacco smoke, two major contributors to cancer, and aims to develop new treatment options for the disease.	 <u>Elaine Leslie</u>	University of Alberta	\$614,072	\$210,000
09-027-SEG	Bacterial biofilm cultivation and imaging with confocal microscopy	This award will help develop a greater understanding of how proteins on the cell surface or on a membrane within a cell bind to other molecules, which may become a powerful tool for advancing the effectiveness of therapeutic drugs and may provide insight into new methods of drug delivery.	 <u>Shawn Lewenza</u>	University of Calgary	\$483,306	\$193,322
09-028-SEG	Molecular analysis of the host-pathogen interface	The award will establish a state-of-the-art molecular pathogenesis laboratory, which will support research aimed at developing alternative treatment strategies to fight bacterial infections. The researcher's approach is to identify compounds that interfere with the molecular interactions at the interface between bacterial pathogens and their hosts.	 <u>Stefan Pukatzki</u>	University of Alberta	\$444,680	\$177,872
09-029-SEG	Tools for Modeling DNA Damage and Repair	The award will purchase computer resources for the research program at the University of Lethbridge. By using computer modelling, Dr. Wetmore investigates how our DNA is damaged by carcinogens and how our bodies use enzymes to repair this damage. The DNA modelling aspect of Dr. Wetmore's research has the potential to be used for the design of new molecules to combat diseases such as cancer.	 <u>Stacey Wetmore</u>	University of Lethbridge	\$353,107	\$122,087
09-030-SEG	Memory networks: ensemble recording, functional imaging, and neurocomputational studies on the biology of memory	Dr. McNaughton's highly innovative research aims to understand the biological mechanisms underlying higher brain function, bringing brain science to a more complete understanding of normal brain function. The results of Dr. McNaughton's research may help us to develop better treatments for brain-related disorders such as Parkinson's disease, fetal alcohol syndrome, brain trauma, stroke, and substance abuse.	 <u>Bruce McNaughton</u>	University of Lethbridge	\$1,277,759	\$426,748
09-031-SEG	Bioengineering Technologies for the Clinical Application of Stem Cells	The award will be used to develop a reliable, efficient and safe method to scale-up the production of specialized stem cells, which could become important in the treatment of Parkinson's and Huntington's diseases. With this equipment, Dr. Behie's team will also have the ability to characterize other types of stem cells, potentially leading to new treatments for diseases such as diabetes, arthritis, and heart disease.	 <u>Leo Behie</u>	University of Calgary	\$704,081	\$200,000

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09-032-SEG	High Power Micro-Computed Tomography (CT) at the University of Calgary	The award will purchase imaging equipment that enhances the capacity at the University of Calgary to do high powered scanning of bone and fossil material. It will become the highest-powered CT scanner at the institution and will be used by the researchers for their program in comparative bone and joint biology.	 <u>Jason Anderson</u>  <u>Jessica Theodor</u>	University of Calgary	\$601,524	\$240,609
09-034-SEG	Multi-Touch Displays for Interactive Information Visualization	The award will purchase equipment that will enhance research capacity in software development for multi-touch digital displays. The software for this new type of display, called massively multi-touch (MMT), encourages collaborative, visual and interactive access to data.	 <u>Sheelagh Campendale</u>	University of Calgary	\$468,690	\$182,537
09-036-SEG	Structural Mass Spectrometry for Developing Therapeutics	The award will support the purchase of a specialized mass spectrometer to develop new imaging technology, advancing our understanding of highly complex protein interactions. With this new capacity, Dr. Schriemer and his team will be able to make important research contributions to the development of antibacterial vaccines and therapies for breast cancer.	 <u>David Schriemer</u>	University of Calgary	\$1,580,174	\$579,912
09-037-SEG	Exploring the Molecular Basis of Transcriptional Control Inside Living Embryos	The award will support the purchase of potentially transformative light microscopy equipment that will allow the researchers to observe single genes being transcribed within a cell or individual proteins interacting with each other. Dr. McGhee will use this demonstration technology to observe and study the transcription of genes in the nematode animal model, which will aid in our understanding of the human digestive tract.	 <u>James McGhee</u>  <u>Jeffrey Gaudet</u>	University of Calgary	\$1,964,914	\$785,966
09-039-SEG	A laser scanning facility for rapid three-dimensional measurement	The award will purchase laser scanning equipment of importance to both geomatics engineering and bioengineering. The research program will specifically focus on potential applications to the analysis of the structural integrity of infrastructure such as bridges, the detection and diagnosis of scoliosis, and the application of surveying and mapping services to private industry and government.	 <u>Derek Licht</u>	University of Calgary	\$354,117	\$139,523

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09-041-SEG	Infrastructure to support the environmental risk assessment of novel transgenic crops	The award will purchase equipment for this research program that will assess the environmental risk of new crops. One of these crops is a specialized canola which uses nitrogen much more efficiently than the canola that is currently available on the market. The researchers will thereby contribute to the important testing process, which will ensure the biosafety of these new crops.	 <u>Linda Hall</u>  <u>Habibur Rahman</u>  <u>Randall Weselake</u>	University of Alberta	\$650,100	\$259,860
09-042-SEG	Microfluidics Platform for Transport Processes in Porous Media related to Energy Sector	This award will purchase equipment to enhance research on the interactions between water, oil, and rock at a micro-scale (microfluidics) that occur in porous material, such as the oilsands reservoirs. Dr. Mitra's research has the potential to create new opportunities for Alberta companies involved in the energy sector by reducing the amount of energy and water needed for oil exploration activities.	 <u>Sushanta Mitra</u>	University of Alberta	\$289,816	\$89,575
09-044-SEG	Infrastructure for Deployment and Maintenance Environmental Wireless Sensor Networks	This award will purchase equipment to further develop and test the deployment of wireless sensor networks on the landscape. The equipment is essential to the team's aim to increase the sensitivity of the technology for detecting remote signals. The fully developed technology could be used for avalanche detection, environmental monitoring, forest fire management, and other related applications.	 <u>Sebastian Magierowski</u>  <u>Geoffrey Messier</u>  <u>Bob Davies</u>	University of Calgary	\$343,955	\$127,027
09-045-SEG	Functional Inorganic Polymers: New Hydrogen Storage Materials and Precursors to Chemically Resistant and Insulating Nanomaterials	This award will purchase equipment to launch this research program in polymer chemistry and nanoscience. One of the research goals is to develop new methods to safely store hydrogen for use in fuel cells. The new equipment is essential for his team to build novel hydrogen storage devices and will complement the facilities already available in the University of Alberta's Alberta Centre for Surface Engineering and Science.	 <u>Eric Rivard</u>	University of Alberta	\$298,040	\$96,400

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09-046-SEG	Advanced Microwave to Millimeter-wave MEMS and CMOS System Development	Drs. Daneshmand and Moez will combine their expertise in radio frequency devices and integrated circuits and systems to develop new microwave devices and test their functionality and limitations. The new devices can be used to improve the speed of data communications and lower the cost of communication products.	 <u>Mojgan Daneshmand</u>  <u>Kambiz Moez</u>	University of Alberta	\$543,950	\$217,580
09-047-SEG	A laboratory to study novel aspects of Neurofibromatosis Type 2 regulation	The award will purchase equipment to study genes that have the potential to regulate Neurofibromatosis Type 2 (nervous system tumours). The disorder affects hundreds of patients in Alberta and the current treatment approach, surgery, does not cure the patient of the disease. Dr. Hughes is investigating a new approach to understand why the disease occurs and how to use this understanding to regulate the growth of the tumour.	 <u>Sarah Hughes</u>	University of Alberta	\$347,248	\$138,899
09-048-SEG	Instrumentation for Nano-particle Research	Dr. Olfert will use the award to purchase equipment to understand how particulate matter emissions affect climate, the environment, air quality, and human health. One of the aims of Dr. Olfert's research is to help inform policy decisions regarding particulate matter emissions. Another aspect of his research is to identify particulate matter from its source and try to reduce its release into the atmosphere.	 <u>Jason Olfert</u>	University of Alberta	\$287,781	\$101,335
10-002-SEG	A Scaleable Optical Sensor Network for Ecosystem Health	Equipment purchased will be used to implement a network of optical monitoring and remote sensing devices to detect changes in ecosystems, such as forests, cropland, or rangeland. The project will gather extensive and integrated environmental data in a cost-effective way, while providing essential information for the sustainable management of Alberta's resources.	 <u>John Gamon</u>	University of Alberta	\$266,703	\$100,000
10-003-SEG	Infrastructure for Understanding the Molecular Basis and Treatment of Cardiac Arrhythmias	The award supports cardiovascular research and the development of new anti-arrhythmic drugs, which would help regulate abnormal heart rhythms. The research will provide fundamental knowledge necessary for developing new, cost-efficient, and more effective therapies for the treatment and prevention of cardiac arrhythmia and sudden death.	 <u>S.R. Wayne Chan</u>	University of Calgary	\$988,797	\$395,519

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10-004-SEG	Ultraperformance Liquid Chromatography - Mass Spectrometry Facility for Plant Bioproducts Analysis	The award will purchase equipment to bolster research in plant metabolism. The equipment will enable the researchers to reliably identify and measure important compounds made by plants that could have applications in pharmaceuticals, flavours, fragrances, insecticides, and other chemical formulations.	 <u>Peter Facchini</u>  <u>Dae-Kyun Ro</u>	University of Calgary	\$1,076,348	\$430,540
10-005-SEG	Advanced Laboratory for Ubiquitous Sensor Network	Equipment purchased with this award will be used to establish a network of self-sustaining (autonomous) sensors to monitor various environments, including agricultural areas and oil and gas fields. The equipment and research will also provide valuable training opportunities to students interested in developing wireless sensor network technology and data analysis skills.	 <u>Henry Leung</u>	University of Calgary	\$980,825	\$392,331
10-009-SEG	Molecular Enzymology Laboratory	Equipment purchased will further the study of enzyme kinetics, and the effects of drugs on enzyme behaviour, research that has implications for a basic understanding of enzymes, and for pharmaceutical applications such as understanding drug metabolism. A better understanding of the interaction of drugs with these enzymes may lead to new treatments for Parkinson's disease and to new therapeutic anti-smoking strategies.	 <u>Andrew Holt</u>	University of Alberta	\$300,801	\$120,321
10-010-SEG	Platelet-Angiogenesis Research Infrastructure for Development of Novel Angiogenesis Regulating Pharmaceutical/Life Sciences	The equipment purchased with this award will support research into cardiovascular disease and cancer in Alberta. Dr. Jurasz aims to better understand the role of blood platelets in regulating the formation of new blood vessels, and investigate their potential to be used as part of a new treatment for damaged tissue from heart disease or cancer.	 <u>Paul Jurasz</u>	University of Alberta	\$493,171	\$197,275
10-011-SEG	In Vivo Cellular Imaging of Brain Structure and Function in Model/Life Sciences of Neurological and Neuropsychiatric Disease	The award will support the purchase of imaging equipment, including an in vivo multiphoton imaging system that allows researchers to see live, real-time, and high resolution views of cells, specifically neurons and glia. The research supported by this award may lead to improved stroke therapy.	 <u>Ian Winship</u>	University of Alberta	\$999,810	\$399,924
10-013-SEG	An Analysis Suite for Characterizing of Smart Polymer/Nanoparticle Composites	The award will purchase specialized equipment, including a differential photocalorimeter and an infrared camera which will be used to study smart polymer/nanoparticle composites. These materials undergo changes when they are exposed to different stimulus like a magnetic field or light. The research will characterize the new materials to better predict and manipulate their unique behaviour, with the long term aim of developing them for biomedical applications.	 <u>Anastasia Elias</u>	University of Alberta	\$192,259	\$76,903

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10-015-SEG	Biodiversity Science and Conservation Ecology Group	The award will support the purchase of essential computing and field equipment for use in biodiversity conservation and wildlife management research. The research aims to develop tools for better regional conservation planning and improved sustainable forestry management practices, with the long term goal of protecting biodiversity in Alberta.	 <u>Scott Nielsen</u>  <u>Fangliang He</u>	University of Alberta	\$336,830	\$115,489
10-016-SEG	Petroleum Microbiology Research Laboratory	Equipment purchased with this award will be used to understand the science of anaerobic (oxygenless) petroleum biodegradation. A better understanding of anaerobic hydrocarbon metabolism could lead to improved tailings pond reclamation, increased methane production from marginal reservoirs, and more effective natural environmental reclamation.	 <u>Lisa Gieg</u>	University of Calgary	\$482,559	\$193,024
10-018-SEG	Infrastructure for Investigation of Organic Nitrates and Reactive Halogens in Laboratory Experiments and in Ambient Air	Dr. Osthoff's atmospheric science research will improve our understanding of pathways that lead to formation of secondary pollutants such as ozone and airborne particulate matter that affect people's health and climate. The atmospheric chemistry research equipment will allow more accurate impact assessments of emissions, and provide scientific instrumentation that presently does not exist in Canada.	 <u>Hans Osthoff</u>	University of Calgary	\$948,998	\$339,691
10-019-SEG	Cell and Molecular Biology Suites for Studying Reproductive Development in Canola and Arabidopsis	The research equipment purchased with this award will allow Dr. Samuel to uncover novel genetic switches that control canola plant reproduction. Identification and manipulation of these novel genes will directly impact canola crop-yield. The infrastructure funds will build cell and molecular biology suites in the Department of Biological Sciences at the University of Calgary.	 <u>Marcus Samuel</u>	University of Calgary	\$973,538	\$280,000
10-020-SEG	Establishment of a Molecular Parasitology Laboratory	Drug resistance in parasites is an important economic and animal welfare problem for livestock agriculture and a major global human health problem. The proposed infrastructure will be used to investigate molecular mechanisms of drug resistance and apply the knowledge to improved diagnostics and control.	 <u>John Gilleard</u>	University of Calgary	\$544,505	\$212,427
10-021-SEG	Germ Line Stem Cell Research Facility	Advances in germ line stem cell research affect biomedical research through generation of animal models and tissue regeneration, agricultural research through improved reproductive efficiency and dissemination of superior livestock genetics, and animal conservation through preservation of genetic material from rare and endangered animals.	 <u>Ina Dobrinski</u>	University of Calgary	\$605,131	\$240,938

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10-024-SEG	Environmental Impact of Prion Diseases	Prion diseases have had an enormous economic and social impact. Of particular importance to Alberta are bovine spongiform encephalopathy (cattle) and chronic wasting disease (deer, moose, elk). This application emphasizes the environmental impact of prion diseases, focusing on the binding of prions to soil, an interaction that enhances infectivity.	 <u>Judd Aiken</u>	University of Alberta	\$932,206	\$340,000
10-025-SEG	Research Facility for the Characterization of Nano-based Biomaterials for Gene Delivery Applications	My research program is focused towards the design of cationic glycopolymers and glyconanoparticles for gene delivery applications. The acquisition of the following infrastructure, widefield microscope, zeta potential analyzer and differential scanning calorimeter/ thermogravimetric analyzer, will strongly enhance our research capabilities and hence we expect to make significant progress in this highly innovative field of carbohydrate-based nanocarriers.	 <u>Ravin Narain</u>	University of Alberta	\$304,066	\$100,000
10-026-SEG	Establishment of Novel Integrated Xenopus Oocyte Heterologous Expression Technologies for the Study of Nucleoside and Other Membrane Transporter Proteins.	Discovered in the YOUNG laboratory, this molecular study of how CNT and ENT proteins move nucleosides across plasma and intracellular membranes will combine the unique versatility/power of heterologous expression in Xenopus oocytes with other technological innovations to improve and expand therapeutic applications of nucleosides in cancer and other diseases.	 <u>James D. Young</u>	University of Alberta	\$939,858	\$340,000
10-028-SEG	Development of a Prion Agent Preparation Laboratory	This infrastructure will support my prion research laboratory focusing on the pathogenesis of prion agents and the characterization of chronic wasting disease. The research goal is to understand the molecular mechanisms of a prion infection.	 <u>Debbie McKenzie</u>	University of Alberta	\$208,113	\$80,000
10-029-SEG	Enhancing mining efficiency and decreasing environmental impact using Scanning Probe Microscopy and X-ray Fluorescence Micro-Probe	Efficient and environmentally responsible mineral (coal and oil sands) processing is central to the continuing success of the natural resource based industry. But there are significant challenges. The industry requires step-out technology to exploit more complex forms of minerals and coal and deal with unpredictable variability of oil sands ores. The cyclical nature of the industry has resulted in a general reduction in training programs. We need to develop a critical mass in world class mineral research and training.	 <u>Zhenghe Xu</u>	University of Alberta	\$797,971	\$313,798
10-030-SEG	In vivo microscopy and real-time quantitative PCR infrastructure to investigate neurodegenerative disorders.	Diseases affecting the central nervous system are a major cause of death and disability in Alberta and Canada. The establishment of the Neurodegeneration Research Unit at the University of Calgary will provide infrastructure to investigate causes and treatments for these pathologies.	 <u>Roger J. Thompson</u>  <u>Shalina Qusman</u>	University of Calgary	\$907,839	\$363,136

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10-031-SEG	Infrastructure for the Environmental Surface Research Laboratory	This fund will be used to equip an environmental surface research laboratory with state of the art equipment for use in research related to nanoparticles, microbes, and organic pollutants, and their interactions with engineered and natural surfaces.	 <u>Yang Liu</u>	University of Alberta	\$269,450	\$105,000
10-032-SEG	Laboratory for the Fabrication & Testing of FRET and Plasmon-enhanced Nanostructured Photovoltaic Devices	Improvements in the design and processing of organic semiconductors coupled with advances in nanotechnology render possible medium to high efficiency solar cells at a fraction of the cost of conventional silicon-based photovoltaics. The fabrication & testing of such devices is the subject of the proposed research.	 <u>Karthik Shankar</u>	University of Alberta	\$204,902	\$80,000
10-033-SEG	Targeting Signaling Pathways in Heart Failure: Potential for New Therapies	The current one year mortality rate after diagnosis of HF remains disturbingly high at between 25- 40%, not to mention the human toll of patient suffering prior to deaths. Our project will create a state-of-the art and highly specialized system in order to study the key elements of heart failure in experimental models which will be complemented by parallel experiments in human explanted hearts with the ultimate aim to foster our understanding of human heart failure and to create new therapies.	 <u>Gavin Y. Oudit</u>	University of Alberta	\$905,032	\$211,430
10-034-SEG	Laboratory for Polymer Electrolyte Fuel Cell Research	Polymer electrolyte fuel cells (PEFCs) can improve energy efficiency and reduce negative emissions. In order for PEFCs to be commercially viable, their cost has to be reduced and their performance enhanced. Novel micro-fabrication techniques and computational design will be used to develop bio-inspired flow fields and electrodes for PEFCs that achieve the necessary cost reductions and performance improvement for commercialization.	 <u>Marc Secanell Gallart</u>	University of Alberta	\$211,869	\$81,854
10-035-SEG	Molecular mechanisms of PCSK9 and ABCG1 in the maintenance of cholesterol homeostasis	Atherosclerotic heart disease is the number one killer in Canada. The requested infrastructure is critical to the success of my team's research on novel molecular mechanisms in cholesterol homeostasis and atherosclerosis. Our findings will lead to the creation of new therapies to reduce the disease.	 <u>Dawei Zhang</u>	University of Alberta	\$672,890	\$269,158
10-036-SEG	Infrastructure for studying both the biophysics of infectious prion oligomers and the prion disease pathology they induce.	The infrastructure will be used to: 1) isolate and characterize the biophysical properties of infectious prion protein oligomers; 2) produce 3D reconstructions of neurons in mouse brain slice cultures after exposure to prions; and 3) investigate the early stages of prion disease pathogenesis in vitro.	 <u>Valerie Sim</u>	University of Alberta	\$1,000,000	\$400,000

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
10-039-SEG	A high pressure chemisorption analyzer for characterization of heterogeneous catalysts under industrial conditions	Funds are requested to purchase equipment for the characterization of heterogeneous catalysts under industrial conditions. The equipment consists of a chemisorption analyzer, which is capable of performing temperature programmed reactions, and a mass spectrometer to analyze products.	 <u>Vinay Prasad</u>  <u>Natalia Semagina</u>	University of Alberta	\$323,064	\$129,175
10-040-SEG	Analysis of the role of genetically defined interneurons in the operation of the locomotor and respiratory CPGs.	The studies proposed in this application will investigate the structure and function of neural networks that underlie simple rhythmic behaviours such as breathing (respiration) and walking (locomotion). The results of these studies will enable us to identify the developmental processes that are essential for the assembly of these neural networks, and allow us to better understand how the respiratory and locomotor behaviours are initiated.	 <u>Simon Gosgnach</u>	University of Alberta	\$929,302	\$371,721
11-001-SEG	Electron Paramagnetic Resonance Spectroscopy Facility for Nanomaterials and Advanced Catalysis	The research equipment purchased with this award will allow Drs. Rene Boeré and Paul Hayes to uncover novel nanomaterials and advanced catalysis and provide scientific instrumentation that presently does not exist in Canada. The research may lead to improved drug development, materials synthesis, and the production of value added chemicals.	 <u>Rene Boeré</u>  <u>Paul Hayes</u>	University of Lethbridge	\$441,105	\$176,004
11-002-SEG	The brain in action: A research facility for the study of sensory and motor integration in healthy and neurological populations	The award will help support the creation of a research facility to study sensorimotor functions in healthy and neurological populations. The research supported by this award may lead to improved diagnosis and treatment of common neurological disorders such as stroke, Parkinson's disease and epilepsy.	 <u>Claudia Gonzalez</u>	University of Lethbridge	\$244,712	\$97,885
11-003-SEG	Molecular characterization of disease mechanisms involved in genetically determined cardiomyopathies	This award will support the purchase of equipment that will enable Dr. Brenda Gerull to further understand the novel genetic factors influencing cardiovascular disease. The equipment and research will also provide valuable opportunities for students to advance their knowledge of cardiovascular disease aetiology, provide training for students in advanced scientific methods and, ultimately, to improvements in healthcare.	 <u>Brenda Gerull</u>	University of Calgary	\$617,167	\$246,866
11-006-SEG	Steroid hormone sample preparation and mass spectrometry laboratory	The equipment supported by this award will be used to investigate the body's responses to steroid hormones. Dr. Wynne-Edwards laboratory will be a powerful tool in improving our fundamental understanding of individual responses to both chronic and acute stress, leading to reduced chronic disease, improved mental health, and healthier children at birth.	 <u>Katherine Wynne-Edwards</u>	University of Calgary	\$999,950	\$299,598

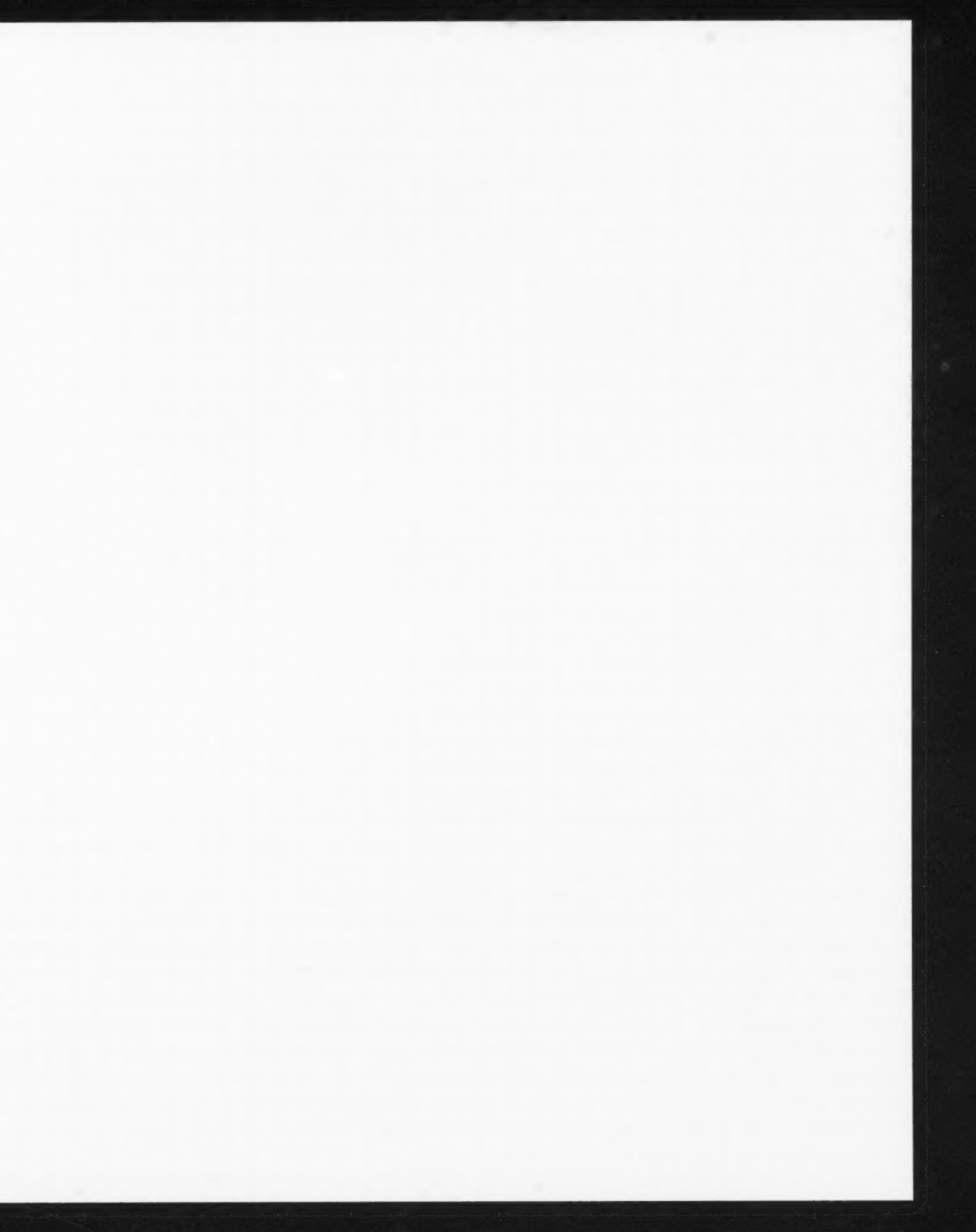
Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
11-007-SEG	Fluorometric instrumentation for the measurement of sub-cellular microenvironments	This award will provide Dr. Yates with the required equipment to further advance the field of cell biology research in Alberta. The capabilities of new equipment will also be important to support Alberta's research initiatives in the areas of fundamental biology of immune cells, disease states and the invention and advancement of research tools.	 <u>Robin Yates</u>	University of Calgary	\$650,935	\$227,923
11-008-SEG	Translational Health Research Collaboratorium	The award will support the development of a custom database for a network of clinical and social scientists with common goal of conducting world class translational health research. Drs. Kaplan, Saunders and Coffin's Collaboratorium will be a powerful tool in designing future programs for the treatment and prevention of gastrointestinal and hepatology diseases.	 <u>Gilaad Kaplan</u>  <u>Chad Saunders</u>  <u>Carla Coffin</u>	University of Calgary	\$438,481	\$175,393
11-009-SEG	Mechanotransduction in cardio-vascular tissues: role of residual stresses explored by real-time in situ microscopy coupled with biomechanical measurements	This award will support the purchase of equipment that will enable Dr. Di Martino to investigate how changes in the structure and function of the components of blood vessels and heart tissues can lead to serious cardio-vascular ailments. The findings from preliminary research may lead to further developments in novel treatment options for these diseases.	 <u>Elena Di Martino</u>	University of Calgary	\$297,389	\$81,240
11-013-SEG	Open Social Mobile Systems for eLearning Research (OSMoSYS)	Drs. Dron and McGreal will combine their expertise in open social mobile systems to develop four synergistic components that researchers at Athabasca University believe characterize the next generation of educational technology systems; Open (free) content, Social networking, Mobile devices and ubiquitous (sensor based) triggers to learning opportunities.	 <u>Jon Dron</u>  <u>Rory McGreal</u>	Athabasca University	\$951,305	\$346,152
11-015-SEG	High-content functional genomic analysis of immune responses	The award supports the purchase of specialized equipment for Dr. Foley's research program to study genomics and cell biology. The new equipment is essential for his team to observe novel immune responses and will complement the facilities already available at the University of Alberta's high-content imaging systems for cell culture.	 <u>Edan Foley</u>	University of Alberta	\$838,247	\$295,299

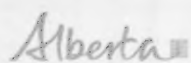
Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
11-016-SEG	Molecular microbiology laboratory for ecology and physiology (M2LEAP)	This award will help Drs. Lanoil and Stein establish a laboratory to understand the structure and function of organisms behind the production and consumption of greenhouse gasses. The researchers will investigate how greenhouse gasses may be regulated by microbial activity and the associated climate change impact. The presence of this infrastructure will establish the laboratory as the centre for environmental microbial ecology and physiology in Canada.	 Brian Lanoil  Lisa Stein	University of Alberta	\$528,869	\$206,000
11-019-SEG	Mass Spectrometry for the Analysis of High Molecular Weight Protein Complexes	The award will purchase leading-edge mass spectrometry (MS)-based tools to characterize biologically important high molecular weight proteins and protein complexes. Dr. Klassen's laboratory will provide powerful tools in the discovery and development of novel strategies for the treatment of a variety of diseases and microbial infections which will lead to the development and commercialization of new drugs.	 John Klassen	University of Alberta	\$1,099,717	\$439,887
11-020-SEG	The Last Best West: The Alberta Land Settlement Infrastructure Project	This award will support the equipment to enable Drs. Baskerville, Carter and Gouglas to develop a Alberta land settlement database. The combination of geo-physical, census and Homestead data creates a unique infrastructure for understanding early land use in Alberta. The data will be important to support Alberta's research initiatives in the areas of natural resources and land management.	 Peter Baskerville  Sarah Carter  Sean Gouglas	University of Alberta	\$984,505	\$393,802
11-022-SEG	Facility for the Fundamental Characterization and Application of Advanced Materials	Dr. Serpe's research will investigate polymeric materials, metal/inorganic nanoparticles, and polymer/nanoparticle hybrid materials in the development of advanced materials. The research supported by this award may lead to materials for a variety of industrial uses such as improved surface coatings for lubrication, ultrasensitive biosensing/spectroscopic techniques, antibacterial polymeric coatings, and photonic materials.	 Michael Serpe	University of Alberta	\$370,369	\$128,000
11-023-SEG	Multiparametric Flow Cytometry System for the Development and Characterization of Environmental Biotechnology Remediation Strategies	Equipment purchased with this award will be used for the development and characterization of microorganisms used to degrade contaminants into non-harmful end products. Dr. Ulrich will investigate several research areas such as removing pharmaceuticals and nanomaterials in drinking water systems and greenhouse gases from the oil sands industry.	 Ania Ulrich	University of Alberta	\$334,294	\$125,000

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
11-024-SEG	Small animal PET/CT: An innovative preclinical multimodality molecular imaging platform for translational research	The infrastructure supported by this award will augment Dr. Wuest's research by equipping his team with the technology to extend their innovative translational cancer research program. Molecular imaging in living subjects offers distinct advantages when compared with conventional in vitro and cell culture research techniques. His research may lead to a faster diagnosis of the disease and more effective treatments.	 <u>Frank Wuest</u>	University of Alberta	\$1,974,632	\$789,853
11-026-SEG	The Alberta Dialysis Databank (ADD)	The equipment purchased with this award will enable the development of an innovative databank, recording hemodialysis treatment strategies and outcome data from all patients treated in Alberta. Dr. Tonelli's laboratory will be a powerful tool in designing future programs for the treatment and prevention of kidney failure. The databank is also expected to lead to the discovery of new therapeutic technologies.	 <u>Marcello Tonelli</u>	University of Alberta	\$1,559,115	\$623,646
11-027-SEG	State-of-the-Art Ultrasound Biomicroscope for the Evaluation of Myocardial & Vascular Function in Maternal, Fetal and Placental Disease in Small Animals	The award will support in vivo ultrasound biomicroscope technology to explore fetal cardiovascular and pulmonary vascular development. A better understanding of myocardial and vascular functions may lead to new treatments for heart disease and to new therapeutic fetal and neonatal cardiovascular diseases and preventative strategies.	 <u>Lisa Hornberger</u>  <u>Sandra Davidge</u>  <u>Bernard Thébaud</u>	University of Alberta	\$597,997	\$239,199
11-028-SEG	Facility to Support the Bench-to-bedside Development of Targeted Drugs and Drug Delivery Systems for Improved Therapeutic Performance	The award supports research in the development of new drugs and drug delivery systems. The results of Drs. Lavasanifar, Kaur and Uludag's research may help us to develop better therapeutic vaccines to treat cancer, engineered biopolymers that deliver mediators of bone growth and/or bone-regeneration in osteoarthritis and new agents for the prevention and treatment of hepatitis C.	 <u>Afsaneh Lavasanifar</u>  <u>Kamaljit Kaur</u>  <u>Hasan Uludag</u>	University of Alberta	\$944,034	\$377,614

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
11-029-SEG	Electrophysiological Imaging and Photostimulation of Neuron-Glia Networks in Ex Vivo Neurological Disease Models	The imaging equipment purchased with this award will be used to develop novel pharmacological strategies for treatment of neurological diseases. The results of Drs. Ballanyi, Smith and Todd's research may help us to develop better treatments for disorder or injury of the brain, spinal cord or nervous system.	 Klaus Ballanyi  Peter Smith  Kathryn Todd	University of Alberta	\$1,990,927	\$796,371
11-032-SEG	Oxidative Stress and Stress Signaling Facility	The facility, established with the support of this award, will allow Dr. Klotz to conduct innovative research in the field of drug safety and risk assessment. The facility will also support cutting edge research on understanding drug side effects based on oxidative stress.	 Lars Klotz	University of Alberta	\$452,796	\$181,118
11-034-SEG	An aquatic center for the evaluation of the effects of water quality on fish health	Dr. Tierney will use the Infrastructure for environment-animal interaction research for the evaluation of the effects of water quality on fish health. The equipment is essential to determine how changes in water flow, water quality (e.g. temperature, salinity, sediment load and dissolved contaminants) affect diverse fish species.	 Keith Tierney	University of Alberta	\$200,505	\$80,000
11-036-SEG	Facility for the Experimental Characterization of Metamaterial Imaging Devices, Radiating Structures, and Scattering Surfaces	Dr. Iyer's research seeks to develop new directions in classical areas of electromagnetics and RF/microwave engineering, but is centered around the study of 'metamaterial' technologies. Metamaterials are artificial materials engineered to have properties that may not be found in nature and may have many diverse applications in ICT, aerospace, solar power, and invisibility-cloaking to name a few. The new laboratory will also be important to support Alberta's research initiatives in the area of applied electromagnetics research.	 Ashwin Iyer	University of Alberta	\$611,985	\$240,000
11-037-SEG	Microparticle Engineering Facility	This award will support the equipment needed to establish a facility, necessary to advance Dr. Vehring's research program in the field of particle engineering. Structured microparticles have significant commercial potential, several development programs for respiratory therapeutics are underway. The research may also enable a variety of novel products in the pharmaceutical, biotechnology, and food industries.	 Reinhard Vehring	University of Alberta	\$536,716	\$200,000

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	SEG Funds Approved
11-040-SEG	Ion homeostasis - from bench to bedside	Drs. Alexander, Casey and Cordat will use the award to purchase the equipment required to understand the fundamental molecular mechanisms behind many of diseases including disorders of the kidney, heart and eye. A better understanding of of ion homeostasis may lead to new treatments for these disease and to new therapeutic strategies.	 <u>Robert Todd Alexander</u>  <u>Joseph Casey</u>  <u>Emmanuelle Cordat</u>	University of Alberta	\$726,973	\$290,786
11-042-SEG	A hyperspectral infrared imaging facility for the non destructive spectroscopic scanning of geological core	Equipment purchased will further the study of spectral analysis and digital imaging of sediments for mineral exploration. The capabilities of Dr. Rivard's new laboratory will be important to support Alberta's research initiatives in the area of natural resource development including oil sands exploration recovery and processing, while mitigating environmental impacts.	 <u>Benoit Rivard</u>	University of Alberta	\$381,618	\$152,647
TOTAL:					\$92,994,435	\$32,086,638
Total Number of Projects - 145					Total Project Cost	Funds Approved
Large Equip. TOTAL:					\$125,399,018	\$44,187,099
Small Equip. TOTAL:					\$80,353,576	\$28,631,360
GRAND TOTAL:					\$205,752,594	\$72,818,459





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